the OIL AND GAS JOURNAL

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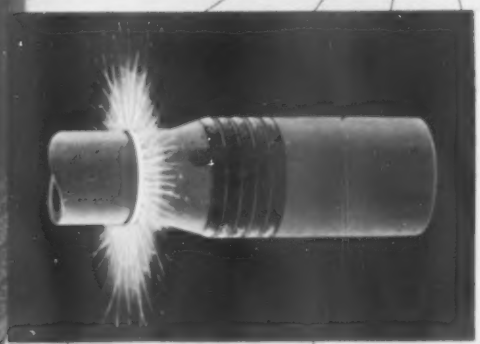

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 AUGUST 23, 1954

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Words won't make a packer—but you can learn a lot about the bottom hole performance of Lane-Wells Packers by talking to the many operators who use them. Things like leakproof pack-off, positive setting, easy pulling, for example. There are reasons, of course; the controlled expansion of the packing element, whose special material doesn't "vulcanize" to the casing but springs back ready for resetting; the generous by-pass area of the circulation packers, which allows fast running in fluid and easy equalization of pressures before pulling; the valve seal which operates even with junk on the seat; the 'Slydeze' slips which don't 'freeze' to the cone; the lifting lugs which reduce compression of the packing element to eliminate sticking; the 'free-wheeling' cage—and the fact that among the 314 types and sizes of Lane-Wells Packers there's at least one which is tailor-made to do *your* job!

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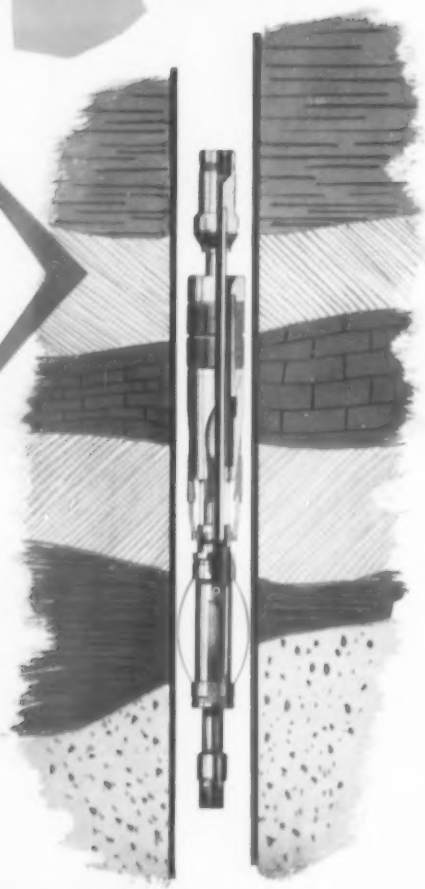

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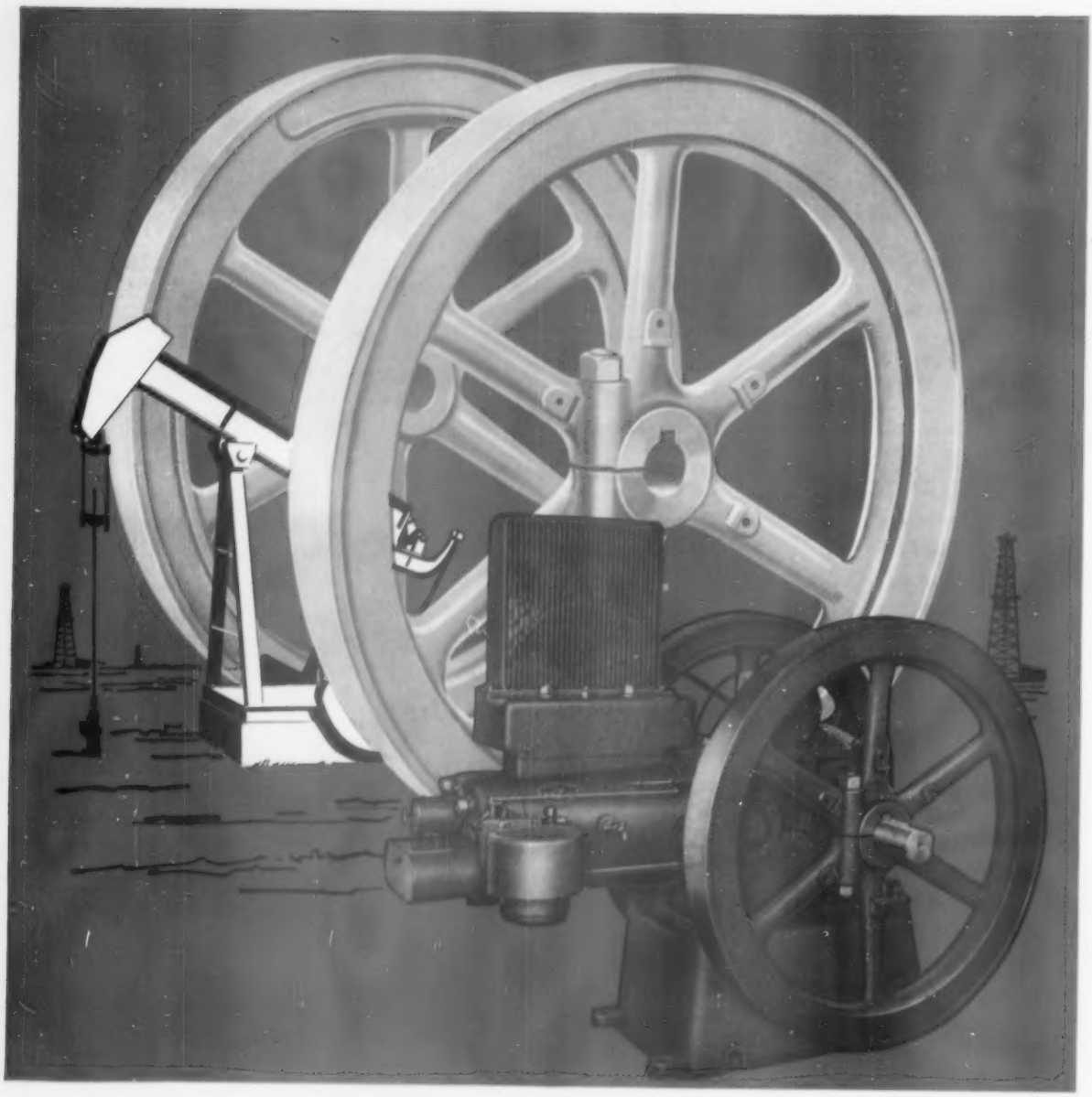
In Brief . . .

1. KNOTTY PROBLEM . . . Causes and measures necessary to alleviate preignition are not yet fully defined and there exists an area of hearty disagreement on what preignition amounts to and what should be done about it. The two well-defined opposing camps at this time are: (1) those who believe additives constitute the answer, and (2) those who believe higher octanes are required. This debate, progress in preignition measurements, and fundamental causes of preignition, are outlined in this special section.

2. DRILLING AIDS . . . Silicone products have many drilling and well-servicing applications. They are used: (1) as high-temperature damping medium in drift-angle and direction-survey tool; (2) in nitrogen-fishing jar; (3) in magnetic detector; (4) in electric-logging instruments; (5) as filler in fluid separator; (6) in core-analysis vacuum retorts; (7) in electrical circuits; (8) as defoamer in drilling mud, and (9) as insulation for slant-hole tool.

3. LINE TESTING . . . Hydrostatic testing of large gas pipelines offers these advantages: (1) test can be carried on with less danger than with gas or air; (2) the completed line can be tested more completely, and (3) blow-out danger is lessened. There is little chance for serious hydrate formation if proper care is used in removing test water and if adequately dehydrated gas is used for line pressuring.

4. AUTOMATIC PUMPER . . . Automatic controls designed to duplicate many functions performed manually by pumpers have been installed by Shell Oil Co. at approximately 465 small producers on its East Coalinga properties in California. The 20 to 30 old wells were marginal and inexpensive facilities were required for reasonable payout. Cost of converting to automatic gaging and sampling was held to $300 per well.



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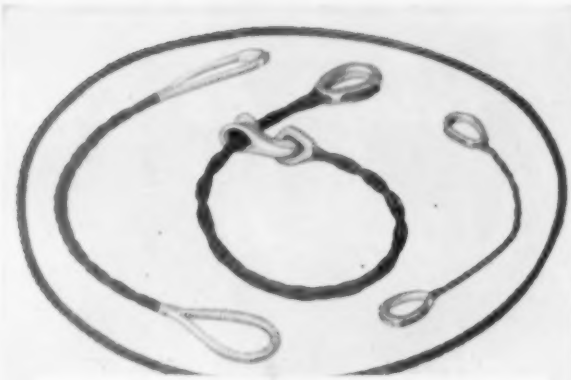

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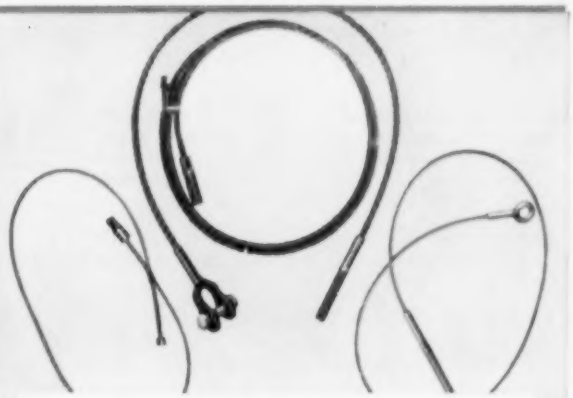

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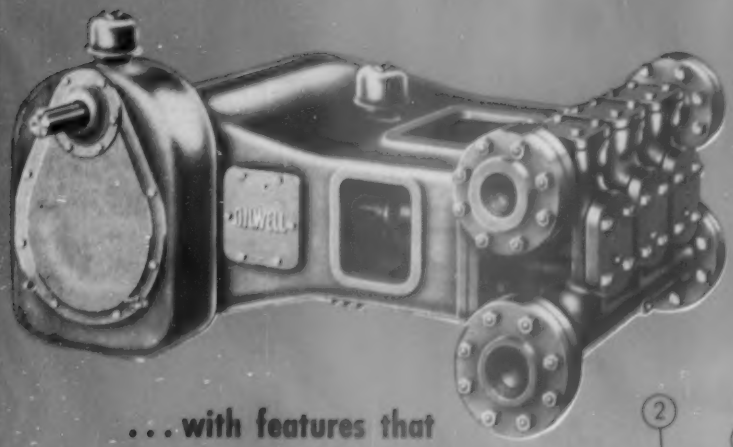

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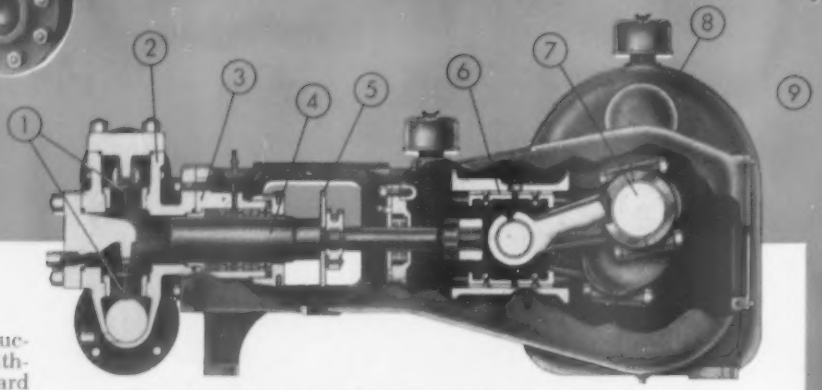

1. VALVE ARRANGEMENT . . . is such that suction valves can be removed for servicing without disturbing discharge valves. Standard valve service is of bronze. Suction and discharge valves are interchangeable.

2. FLUID ENDS . . . provide two suction and two discharge connections and can be furnished in bronze or cast iron.

3. STUFFING BOXES . . . are individually removable through the frame cradle without disturbing fluid cylinders.

4. PLUNGERS . . . can be furnished in hardened steel, Colmonoy, or porcelain enamel. Separate stud rods permit plunger changes without disassembling the crossheads.

5. FLEXIBLE BAFFLES . . . on each plunger extension prevent liquids, which might leak past the plunger packing, from reaching the diaphragm packing and entering the power frame.

6. CROSSHEADS . . . are equipped with renewable shoes and have full floating crosshead pins that are case hardened and finish ground to insure proper fit and long wear.

7. CRANKSHAFT . . . is of forged alloy steel fully heat treated and can be direct connected to slow-speed drives.

8. A GEAR REDUCTION UNIT . . . which can be mounted on either side of the pump frame, can be furnished for high speed drives.

9. HEAVY-DUTY BEARINGS . . . on all revolving shafts are of the adjustable, tapered roller type.

DISPLACEMENT AND HORSEPOWER REQUIREMENTS

Plunger Size, Inches	Max. Working Pressures, psi	DISPLACEMENT Barrels per 24 Hours at Pump Speeds (rpm) of: 80	120	160	180	200	220	240	250
No. 334-P—2	1,600	449	673	900	1,010	1,123	1,230	1,348	1,405
2¼	1,260	564	847	1,128	1,270	1,411	1,552	1,698	1,765
2½	1,020	702	1,054	1,405	1,581	1,757	1,932	2,108	2,195
2¾	840	841	1,261	1,682	1,892	2,102	2,313	2,523	2,630
3	700	1,002	1,503	2,004	2,255	2,505	2,756	3,006	3,130
No. 344-P—3¼	605	1,180	1,772	2,360	2,660	2,960	3,260	3,540	3,700
3½	520	1,370	2,060	2,740	3,080	3,430	3,780	4,110	4,290
4	400	1,786	2,678	3,571	4,018	4,464	4,910	5,357	5,580
Pinion Shaft rpm: Gear Ratio, 4.45:1	....	356	534	712	801	890	978	1,067	1,110
Brake Horsepower Required	...	14.0	21.0	28.5	32.0	35.5	39.0	42.5	44.5

For larger waterflooding requirements, see "Oilwell" 6-in. and 8-in. stroke triplex plunger pumps.

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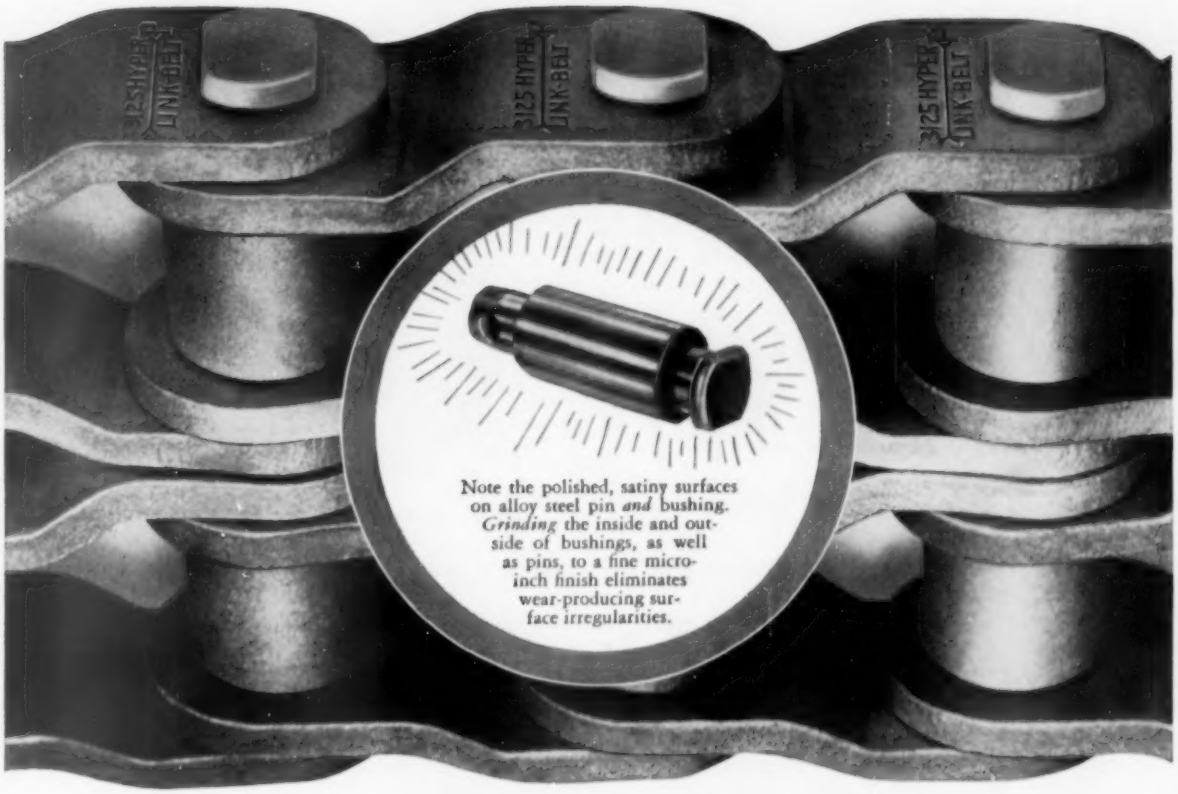
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Note the polished, satiny surfaces on alloy steel pin *and* bushing. *Grinding* the inside and outside of bushings, as well as pins, to a fine micro-inch finish eliminates wear-producing surface irregularities.

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This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	228
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	32
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	13
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	28.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

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Proved in 12 years of field use, Dump Bailer Service is called for first to handle these jobs—building temporary or permanent bridges; covering the top of shots; plugging back in the bottom of hole; dumping water shut-off materials; and chemically removing Securaloy pipe, a new eight-hour process that eliminates days of drilling.

For all these jobs and for many more important remedial operations, call for the fast first aid of Halliburton's Dump Bailer Service. Then you are sure of having fast dependable service—not costly hours of wasted down time. Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

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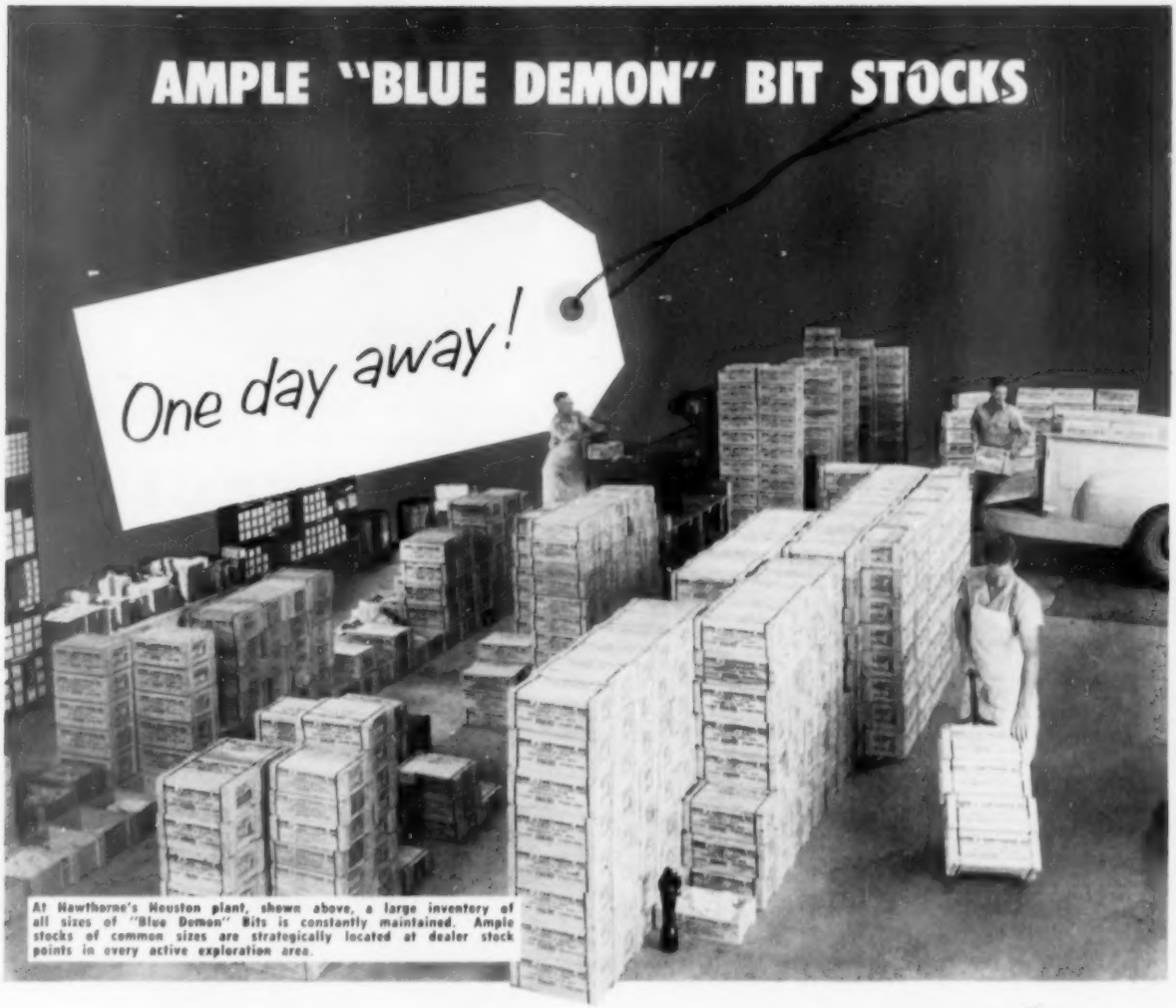

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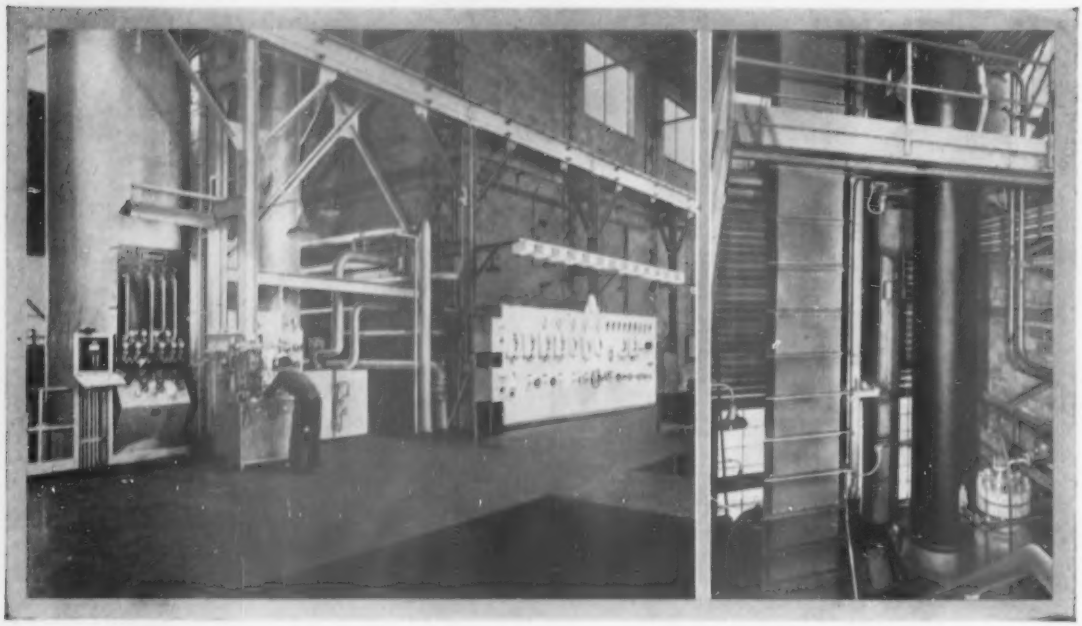
by

Casale ammonia synthesis



55 Tons per day of liquid anhydrous Ammonia is being produced at this new plant of the Pennsylvania Salt Manufacturing Company at Wyandotte, Michigan. The Hydrogen is a by-product from Pennsalt's adjacent chlorine plant.

The photographs show the Liquid Air Plant and the control board in the compressor building; also, the Casale ammonia condenser, deoxidation reactor and convertor.

For a general description of this installation, designed, constructed and licensed by Foster Wheeler:

write for HE—4-54

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK

more barrels per dollar

The new Axelson Model H-100 Hydrax is proving itself in the field where it solves the need for a pumping unit that couples low first cost with trouble-free operation. Because the unit combines a fast down stroke with a slow upstroke, an almost constant flow of oil is possible. Increased sucker rod life results from the Axelson designed hydraulic reversal valve (patent applied for). This valve has no external moving parts.

Axelson HYDRAX®

6′ and 10′ stroke hydraulic pumping units

SPECIFICATIONS

Polished Rod Load (Max)	13,000 lbs.
Stroke Length (Nominal)	6 Feet
Strokes Per Minute (Max)	4.6
Upstroke Polished Rod Speed (Max)	36 FPM
Pump	40 GPM
System Fluid (Approx.)	85 Gals.
Cylinder Diameter	5 Inches
Operating Pressure (Max)	700 PSI
Input Horsepower (Max)	20 HP

AXELSON MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.
LOS ANGELES 58, NEW YORK 7, ST. LOUIS 14, TULSA 1

DAIRY & FARM EQUIPMENT • WASTE CONTAINERS • STAINLESS STEEL COOKWARE • CAR ACCESSORIES • TANKS • AGITATORS • SMOKE STACKS • DUST COLLECTORS • COAL & ASH HOPPERS • FITTINGS • ELECTRICAL ACCESSORIES • ORDNANCE MATERIEL • UNISHELTER RELOCATABLE HOMES • EXPORT ONLY: LOCOMOTIVES • TRACKWORK • CARS (MINE, ORE, CANE, INSPECTION) • UNISTRUT METAL FRAMING • WEED BURNERS • BRICK & TILE MACHINERY CANE LOADERS

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cylinder drain line

returns all leakage back to main reservoir. A check valve is strategically used in this unit to allow a vacuum above the working piston to increase operating efficiency.

cylinder base

The unit tripod attaches to the bottom of the base, the cylinder into the top portion and the reverse valve assembly attaches to one side. Both power and exhaust fluids are ported through the cylinder base. An important feature is the ability to provide adequate pressure at lower reversal, which assures operation of the pilot valve.

reverse valve and pilot valve

are both hydraulically operated and the combination is simplicity itself in design. Only three pressure lines feed into the pilot valve. One is internally constructed to one end and two to the other end. Each of the pressure sources operates on different areas.

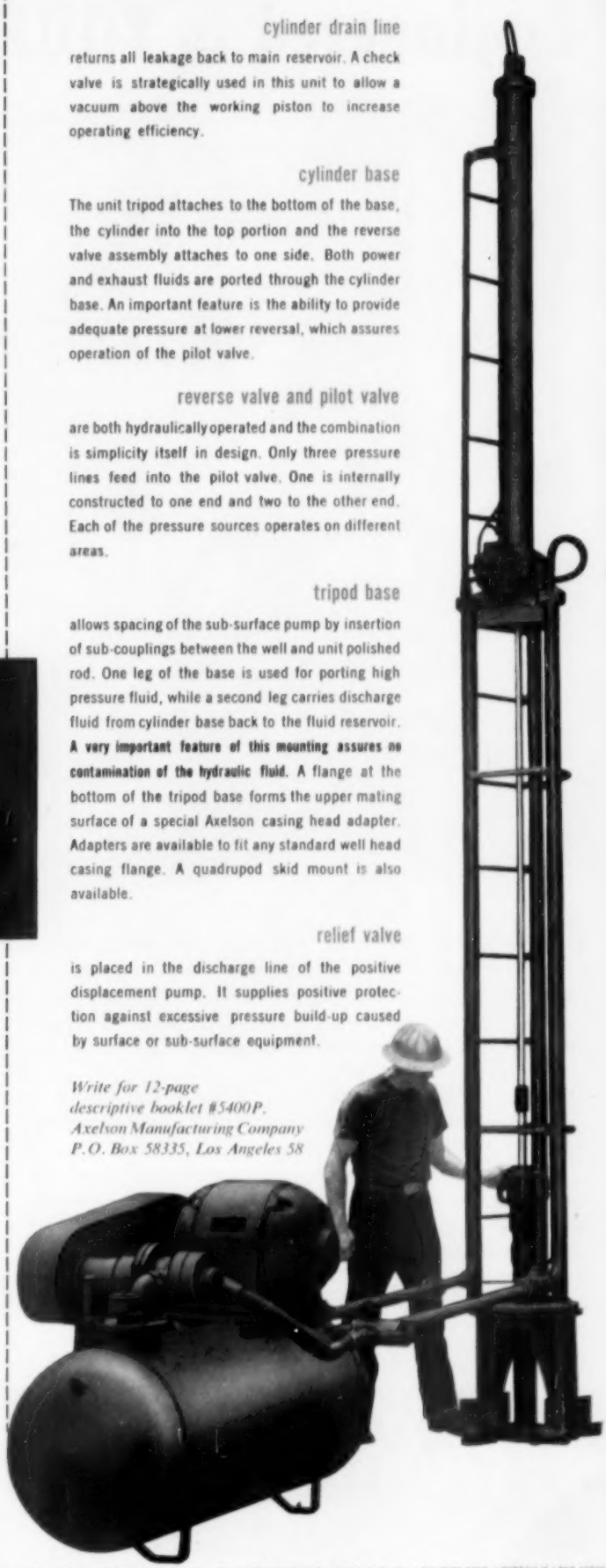
tripod base

allows spacing of the sub-surface pump by insertion of sub-couplings between the well and unit polished rod. One leg of the base is used for porting high pressure fluid, while a second leg carries discharge fluid from cylinder base back to the fluid reservoir. **A very important feature of this mounting assures no contamination of the hydraulic fluid.** A flange at the bottom of the tripod base forms the upper mating surface of a special Axelson casing head adapter. Adapters are available to fit any standard well head casing flange. A quadrupod skid mount is also available.

relief valve

is placed in the discharge line of the positive displacement pump. It supplies positive protection against excessive pressure build-up caused by surface or sub-surface equipment.

Write for 12-page descriptive booklet #5400P. Axelson Manufacturing Company P.O. Box 58335, Los Angeles 58



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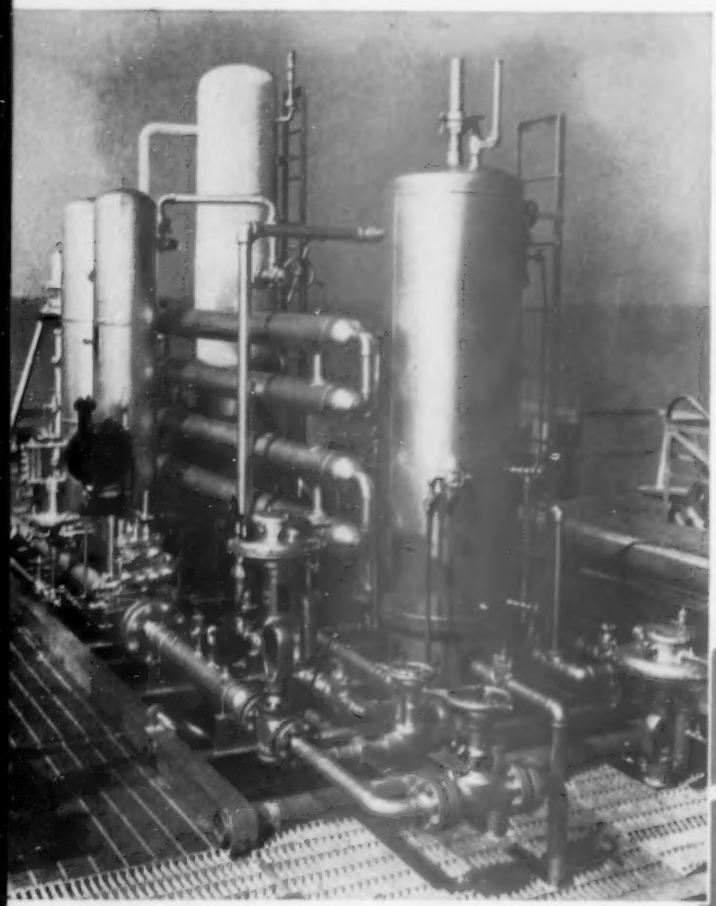
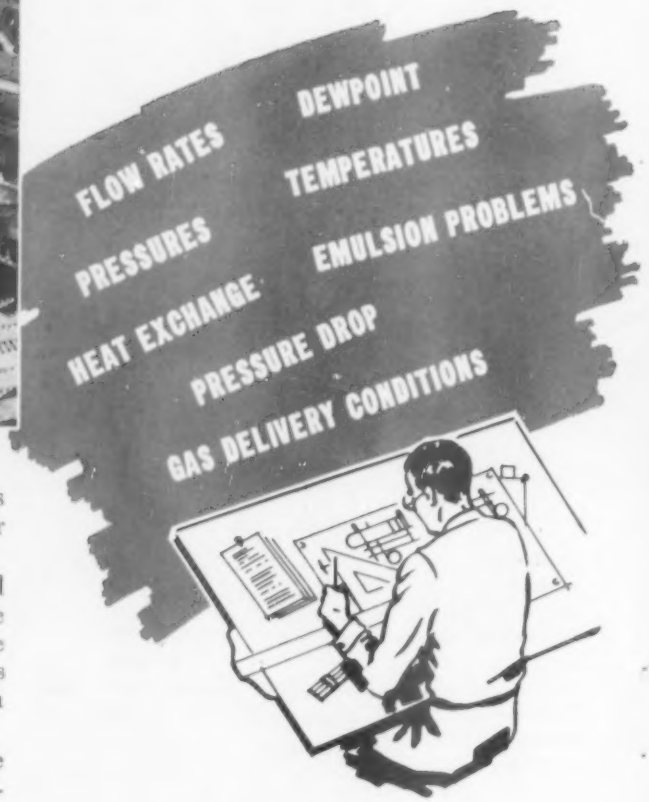


by Parkersburg



• Various fields and wells have their own set of factors which determine the cold separation unit required for optimum efficiency and top performance.

Leader in cold separation, Parkersburg has studied and analyzed the problems on thousands of wells, under the widest range of conditions. Applying these data to the factors existing on your well, Parkersburg engineers "custom build" the Hyreco Unit that delivers maximum efficiency and performance on your installation.

The Hyreco thus installed is a combination of the basic elements assembled into the unit that delivers maximum efficiency and performance . . . highest returns on your investment.

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OIL FIELD EQUIPMENT

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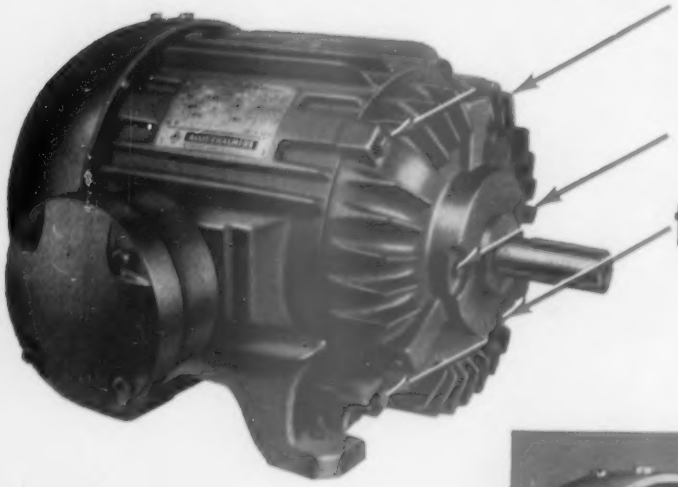
Here's motor superiority

you can see

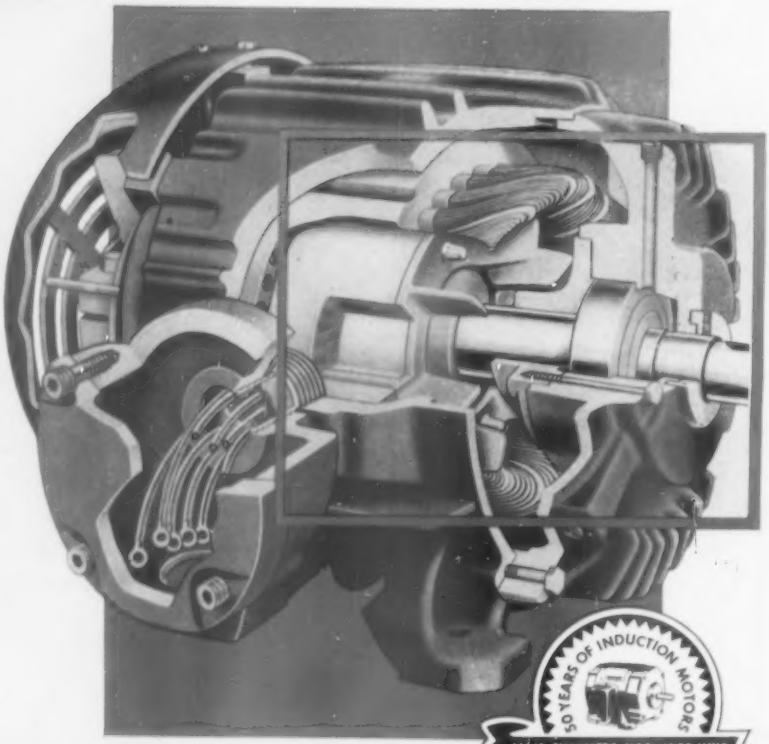


It takes 6 bolts not just 4 to give full bearing protection

THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.

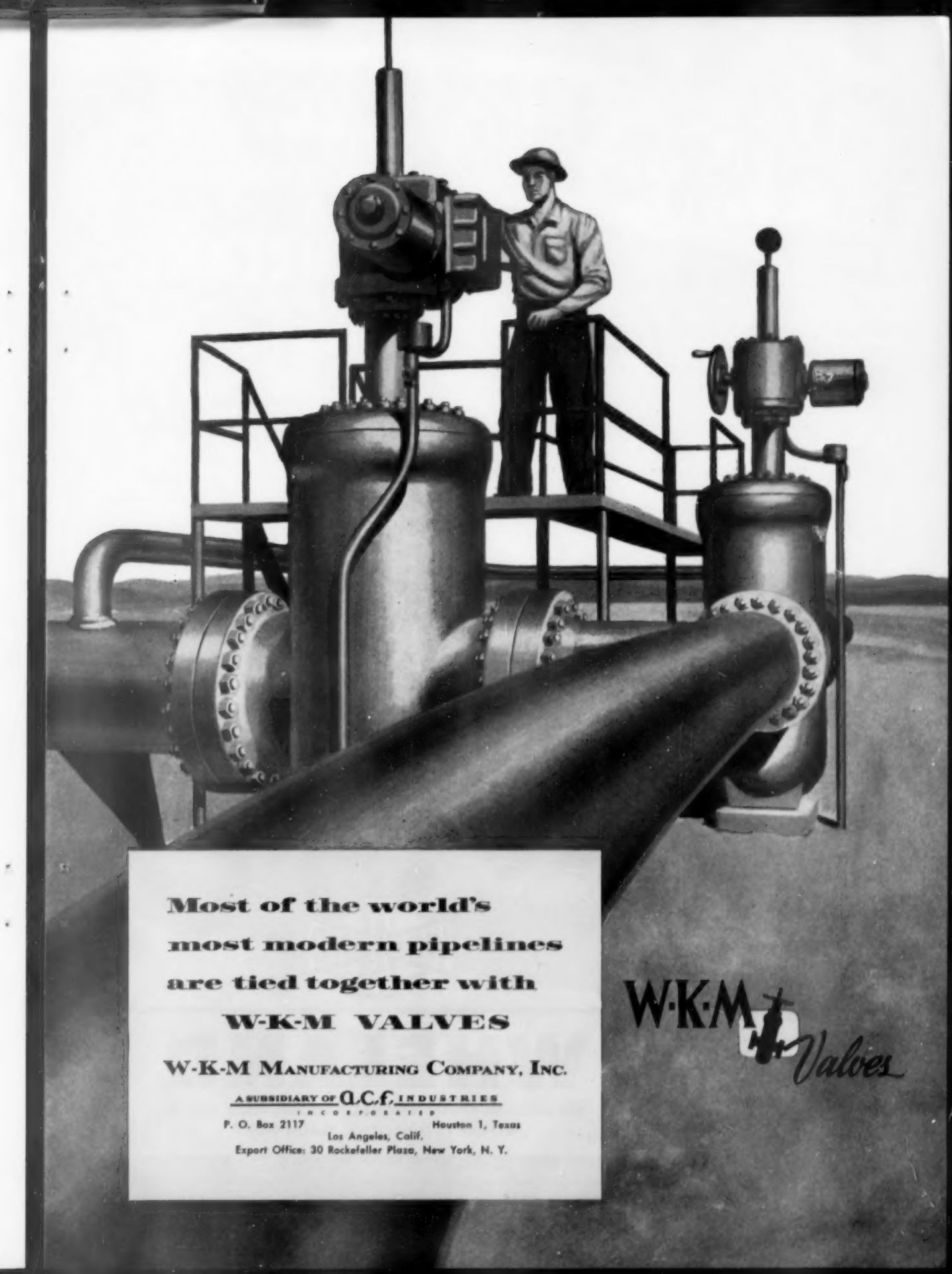


Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-4447



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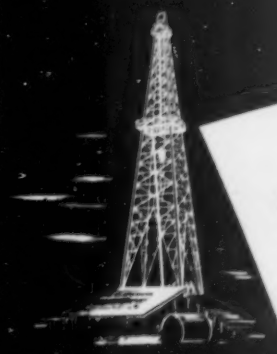

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Faster drilling takes more pressure and more horsepower at the bottom of the hole. The Wheland HP-14000 Pump can handle the power and deliver the mud with that extra pressure that makes hole in a hurry. This pump often makes the difference between profit and loss on a drilling contract. It saves drilling time and bit costs.

The Wheland HP-14000 delivers the best balance of pressure and volume for jet drilling operations. Like any pump used on jet drilling, for maximum speed and depth it must be fitted with proper size liner and run at correct speed and pressure in relation to:

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and data sheets of actual jet drilling performance

WHELAND

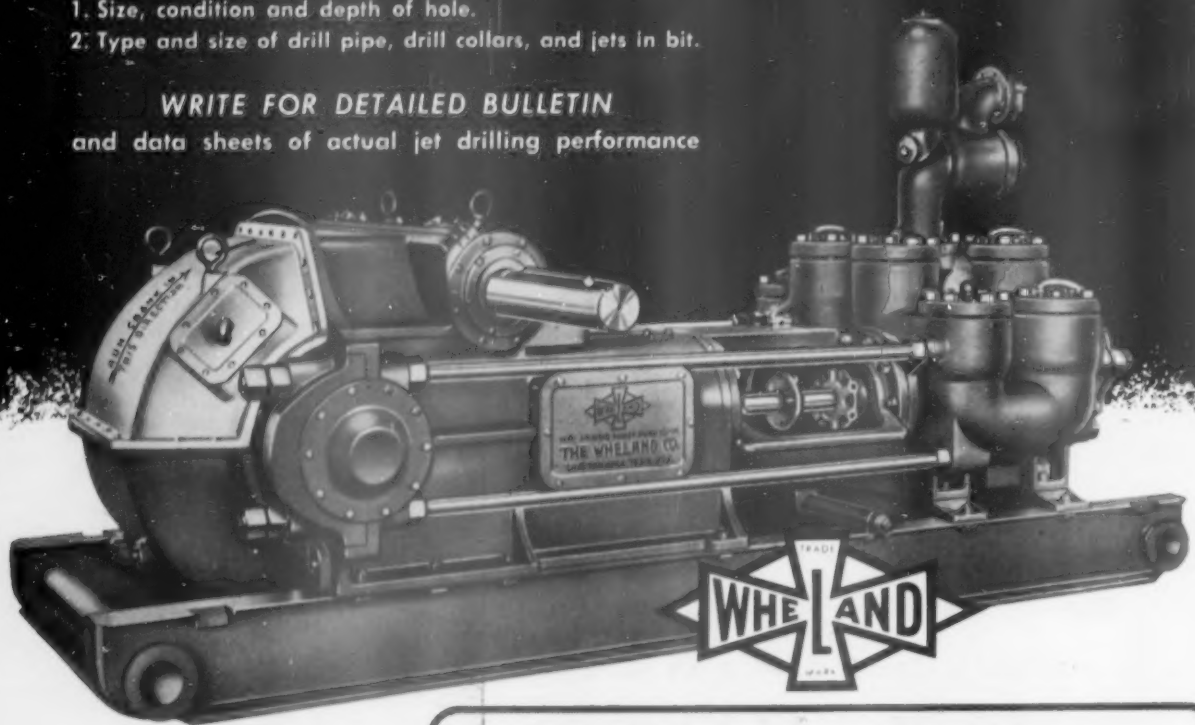
HP-14000 7½" x 14"

DUPLEX SLUSH PUMP

350 HORSEPOWER
NOMINAL INPUT AT 60 R.P.M.

Discharge pressure with 7½" liners 838 PSI

Discharge pressure with 5½" liners 1627 PSI



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Republic Aviation operates P&H high-frequency welders as standard metallic arc welders, also, so that duplicate equipment does not have to be purchased.

More than doubles welding speed with P&H

30 P&H TH-200 high-frequency machines make inert gas arc welding 2½ to 3 times faster than former gas welding at Republic Aviation Corporation

No replacement maintenance in three and a half years of two-shift operation

You don't have to take our word for the outstanding performance record of P&H Welders. The following statements are actual quotes from a certified report issued by the H. P. Gould Co. of Chicago, who made an impartial study of welding operations at Republic Aviation Corporation, Farmingdale, L. I., N. Y.

"In the building of faster and better aircraft, new developments in welding have played an important part and P&H high-frequency inert gas welding has proved that it can solve the problems of welding aluminum alloys.

"Three and a half years ago, Republic Aviation tested P&H TH-200 HF Inert Gas AC Arc Welders, and evaluated them against the existing equipment in the plant, as well as against outside competition.

"P&H welders of four different types are now used in four locations in the plant, for the welding of hundreds of different parts. In general, they are welding aluminum alloys from .032" thickness up to .250", and heat-resisting alloys from .010" up to a thickness of .093". For arc-welding alloy steels (4130, 4140, 8630, 8740, etc.), experience has proved P&H electrode AW-4 most satisfactory, and it is used exclusively.

"Republic Aviation welding engineers back up the claim of the makers that P&H welders require very little maintenance. The 30 high-frequency arc welders have had no replacement maintenance whatever in three and a half years of two-shift operation — and the operating cost of each P&H TH-200 HF Welder is only 40¢ per day."

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We've given you the Republic Aviation story in a nutshell! You can get all the detailed facts and figures by reading Gould Report No. 5311. Write for your copy today.

P&H WELDING DIVISION

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The Petroleum Industry

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Only the AMERICAN-MICROSEN PROCESS CONTROL SYSTEM incorporates this engineering achievement.

DC TRANSMISSION of process information is the greatest compatability factor for complete automation — since most electronic print-out, monitoring and computing devices use DC in their measuring circuits. The simple two-wire DC communication lines are unaffected by induced alternating currents and varying line resistance.

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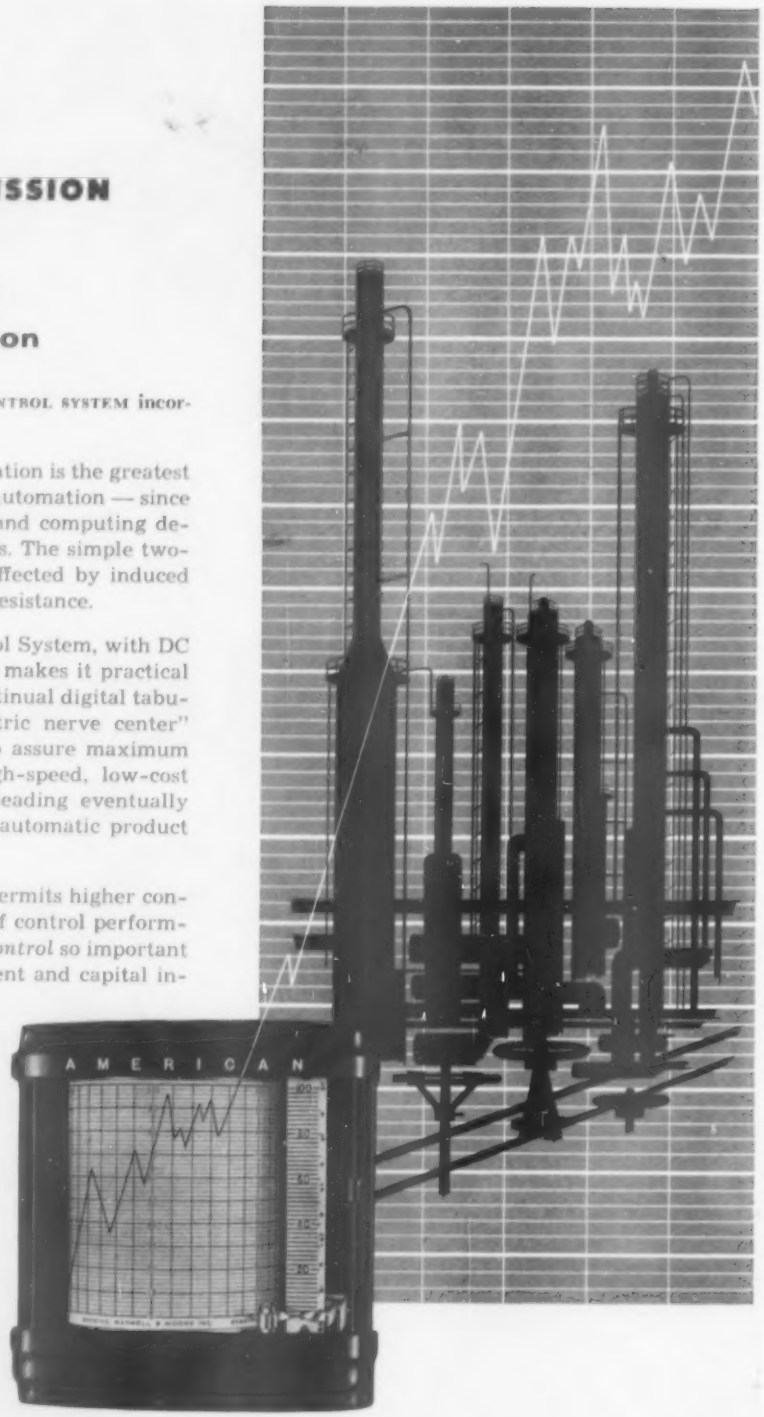
Instantaneous DC signal transmission permits higher controller gains — creates a new concept of control performance. It offers the *improved quality of control* so important in reducing the size of process equipment and capital investment for a given through-put.

The all-encompassing advantages of the American-Microsen Process Control System assure the highest reliability of instrument performance, minimum maintenance and the utmost in flexibility—all vital to the economical operation of the ultra modern plant of today and the standard plant of tomorrow. Your inquiry is invited. Write for Catalog 164.



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On the basis of 1¢ per KWH, the 35 BHP saving for a 5000-hour year (approximately 14 hours per day) amounts to $1300. This saving, capitalized in 4 years at 4% adds up to $5520. Yet the price of the new pump that saves $5520 is only $4054.

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To conform with the legal weight, length and width set up by the individual states, WILSON has developed the Mogul "42." This winch is undoubtedly the most modern winch in the field and is rapidly gaining great popularity. This modern winch has been combined with the New Wilson Heavy Duty Truck POWER-TAKE-OFF and the new Wilson Masts to make a COMPLETE WELL SERVICING UNIT that meets all weight requirements.

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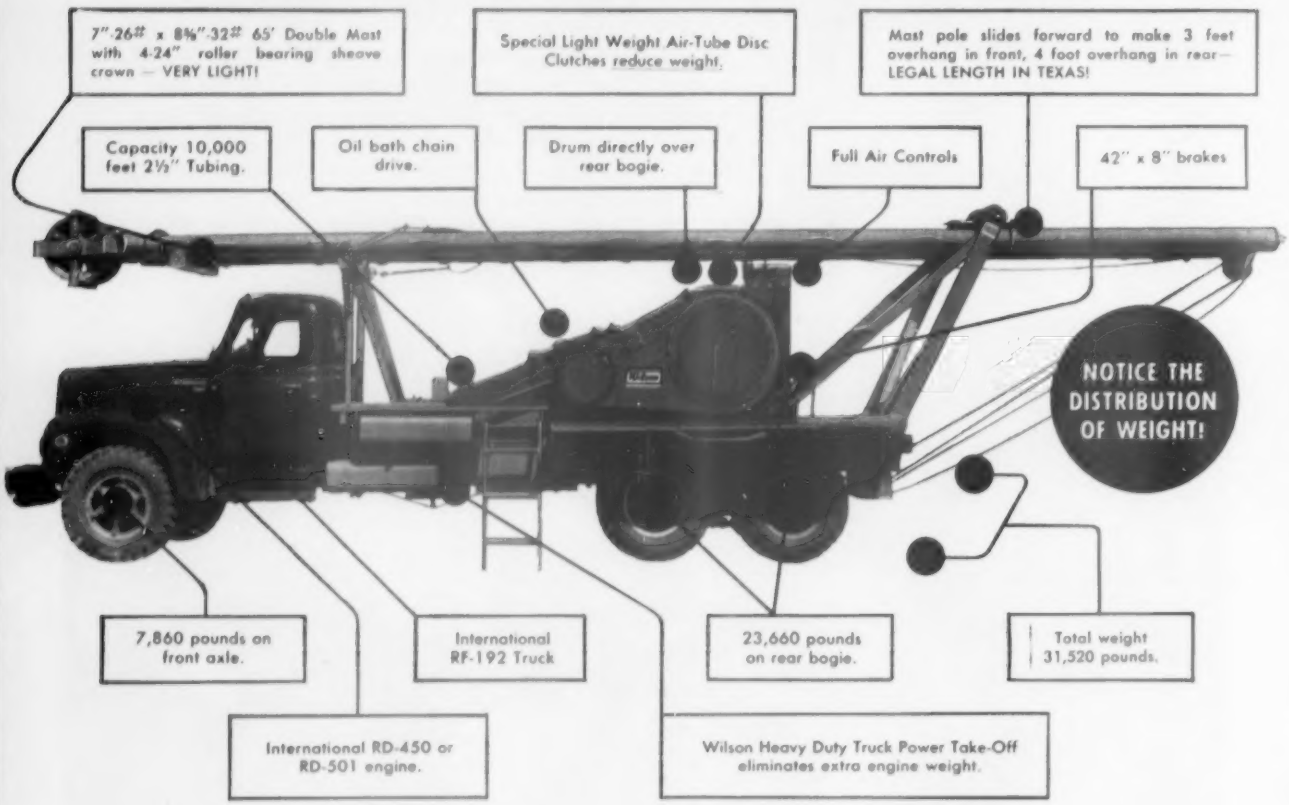
7".26# x 8⅝".32# 65' Double Mast with 4-24" roller bearing sheave crown — VERY LIGHT!
Special Light Weight Air-Tube Disc Clutches reduce weight.
Mast pole slides forward to make 3 feet overhang in front, 4 foot overhang in rear — LEGAL LENGTH IN TEXAS!
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Full Air Controls
42" x 8" brakes
NOTICE THE DISTRIBUTION OF WEIGHT!
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Wilson Heavy Duty Truck Power Take-Off eliminates extra engine weight.

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- **Long term flexibility**
- **Resistance to crushing action**
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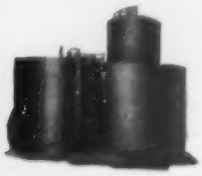
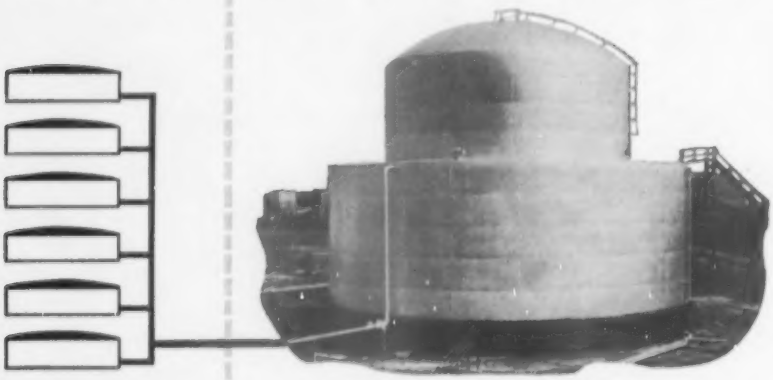
The Hammond DIALIFT is the modern tank for eliminating breathing losses and reducing filling losses. It gives maximum conservation of vapors at lowest cost.



42'6" x 40' Liquid Storage Tank 22' x 17'9" Dialift. Housing — 6300 cu. ft. capacity Inter connected to a 25' x 40' Cone Roof Tank

50' x 48' Liquid Storage Tank 30' x 15'9" Dialift. Housing — 12,500 cu. ft. capacity

The DIALIFT consists of a tubular membrane attached gas-tight to the inside periphery of a cylindrical housing. In operation the DIALIFT functions as the lung of the storage tank. The membrane lifts under a slight pressure when additional vapor storage space is needed, and lowers when less vapor space is required; self-adjusting to the constantly changing breathing conditions within the tank.



80' x 30' Liquid Storage Tank 35' x 17'9" Dialift. Housing — 20,000 cu. ft. capacity

It is easy to convert an existing Cone Roof Tank to an efficient DIALIFT installation. A DIALIFT housing is superimposed on the existing roof, breather holes are installed through the roof plating permitting a free passage for all vapors, no other preparation is necessary.

60' x 48' Ground Type Dialift. 150,000 cu. ft. capacity

*patented

Bulletin 53DL details and describes the Hammond Dialift . . . *Write for your copy.*

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NEW LUNKENHEIMER QUARTER-INCH BRONZE NEEDLE VALVES

Fig. 906

Solve your space problems!

INSTRUMENT BOARDS ARE CROWDED — and up until now, the size of needle valves installed behind instrument panels has been a serious problem. But this revolutionary new quarter-inch valve *saves as much as 20% in size* — yet is actually stronger than the conventional design.

It's safer, more accurate, and more compact — easier to install and maintain! The reason: the body of the new figure 906 is carefully machined out of a cast block of close-grained bronze. It gives you all three of the "most wanted" needle valve features — great strength, compact size, and absolute accuracy of flow control.

Figure 906 is available in a wide range of sizes and in both globe and angle patterns. The quarter-inch size, designed for instrumentation, is only 2¾ inches high — 1½ inches wide. Larger sizes, where bulk is not a problem, are comparable to conventional needle valves. In the globe design, you can take your choice of famous Stemalloy® bronze stems or cadmium-plated steel stems. All patterns have new gland followers and fine thread-pitch for close regulation.

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THE ONE *Great* NAME IN VALVES

L-153-23

TIMKEN® seamless tubing eliminates drilling, saves steel and machining time!

NO need to bore out bar stock to make hollow parts when you use Timken® seamless tubing. The center hole's already there! You don't waste steel but only pay for the steel you use.

Because you don't have to bore the center hole, you save machining costs, too. Finish boring is often your first production step. Screw machine stations can be released for other jobs. So you add machining capacity without adding machines.

Our engineers will save you even more money, too, by studying your problem and recommending the most economical tube size for your hollow parts jobs.

You're assured of the highest internal quality with Timken seamless tubing. The piercing process by which it's made is basically a forging process. It has a uniform spiral grain flow for greater strength, and a refined grain structure which brings out the best quality of the metal. And the Timken Company's rigid quality control keeps this quality uniform from tube to tube and heat to heat. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD — THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Ansul

is the only dry chemical fire extinguisher backed by a five year warranty!

Here is proof of Ansul's superiority . . . *a five year equipment warranty*, the only one of its kind in the fire control industry.

For the buyer of fire equipment this important warranty means many *extra* years of trouble-free protection plus freedom from costly and frequent maintenance checks and repairs.

The special design and construction features that make this warranty possible provide not only dependable protection but also *fast, effective* fire control. Ansul's *weather-tight* construction keeps out moisture and resists corrosion. *Patented nozzles* deliver the right kind of stream for your fire protection problem. The *sealed pressure cartridge* puts Ansul's "Plus Fifty" dry chemical to work immediately—no delay or lag. And finally *rugged construction* makes it possible for Ansul equipment to give peak performance under the toughest operating conditions.

HERE IS THE BIG TRAINING AND SERVICE PLUS OFFERED ONLY BY ANSUL!

Available without cost to all Ansul users.

Training for your personnel at your plant by Ansul specialists.

Customer training school at Marinette for your key safety personnel.

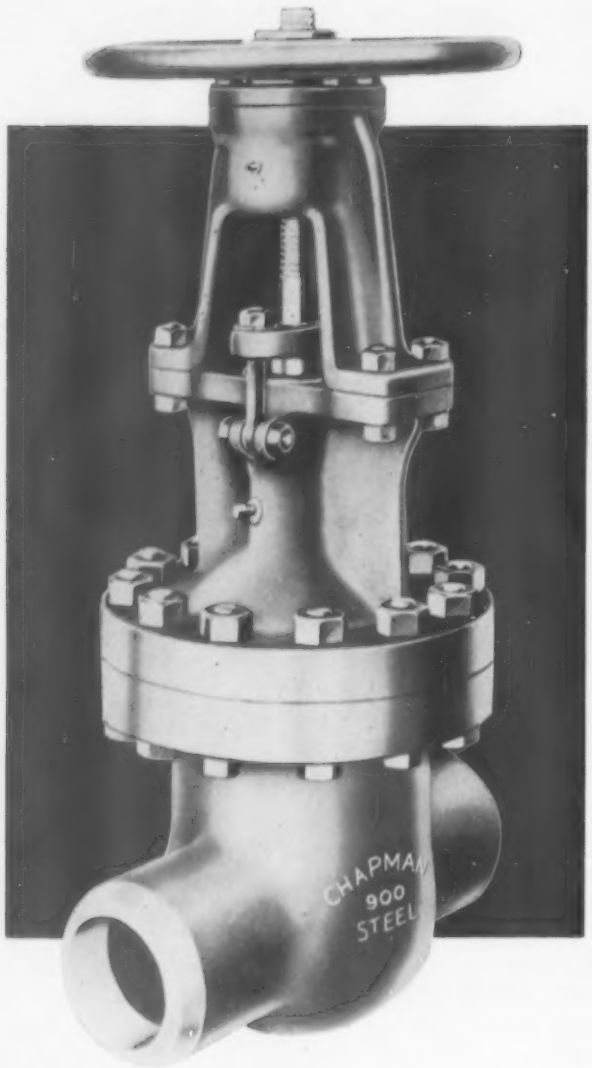
Visual aids on fire control for your safety meetings and other training.

In-plant survey to scientifically determine your fire protection needs.

Call the Ansul Man!

ANSUL

Get in touch with your local Ansul man through the "yellow pages" or write ANSUL CHEMICAL COMPANY, Fire Equipment Div., Dept. F-93, Marinette, Wisconsin.



Special Qualities at Standard Prices
...in CHAPMAN Steel Valves

When you buy Chapman Steel Valves, you buy dependable operation and low maintenance cost — you can select steels to meet your specifications from over a dozen alloys made in Chapman's own steel foundry, under rigid scientific supervision.

When your valves are Chapman, you're sure they seat tightly and accurately, without jamming, chattering or wearing excessively. Close tolerances mean long service and little maintenance.

The Chapman Steel Valve line is complete — gates, globes, and checks for all pressure classes . . . 150, 300, 400, 600, 900 and 1500 pounds, and for a temperature range of −150°F to 1000°F. Valves are supplied with bolted or welded body and bonnet joints and flanged or welding ends to meet service requirements.

Chapman's long experience and mass production mean economies. Quality is unsurpassed. So it pays to see Chapman first for every steel valve requirement . . . standard or special, gate, globe, angle or check. Chapman Steel Valves equal or exceed A.P.I. standards in every range. Write for Catalog No. 20.

The CHAPMAN Valve Manufacturing Co.
INDIAN ORCHARD, MASSACHUSETTS

ANOTHER PROOF OF AUTOCAR QUALITY

Balanced Driving Assembly

VIBRATION in a motor truck is like an insidious disease. It starts in one place and spreads all over. It results in premature wear, failure of companion assemblies and excessive driver fatigue.

Autocar stops vibration before it gets started. A Dynamic Balancing Unit balances the driveshaft. In addition to this, balancing is extended to each unit of the driving assembly to assure that driveshaft, crankshaft, flywheel and clutch assembly are vibrationless and in balance with one another. Autocar even balances the front tire, rim and wheel assembly.

AUTOCAR TRUCKS

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Autocars are sold and serviced throughout the world

Send for the Autocar Fact Booklet. It describes Autocar's anti-vibration measures and other exclusive features which help make Autocar the quality truck of the industry. Mail the coupon today.

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19H

CEC increases the scope of

industrial mass spectrometry

through two great instruments for process monitoring and control

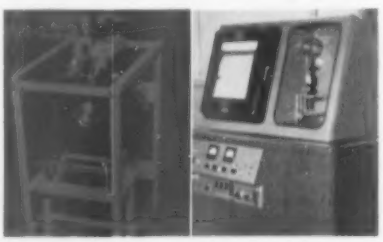
Consolidated's Model 21-610 mass-spectrometer and its companion, the new Model 21-620, far excel all other instruments of comparable price in performance capabilities and reliability in industrial environment. The extreme sensitivity of the 21-610—accurate to a few parts per million—qualify it for highly critical purity studies as well as process monitoring and control applications. Fitted with an accessory hand-held probe, either model serves as a leak detector for any gas within its mass-range. The 21-620's resolving power up to mass 150 further extends the applicability of an industrial mass-spectrometer to research laboratories and medical centers, as well as to plants of chemical, petro-chemical, petroleum and gas industries. Nearly identical in appearance, the 21-610 features the Diatron ion analyzer and the 21-620, a new cycloidal focusing analyzer.

21-620 Except for slightly less sensitivity, the 21-620 has all the capabilities of the 21-610 plus many others. Where the task is to analyze "heavy" gases or liquids, either in plant locations or in the laboratory, the 21-620 process monitor mass-spectrometer is the ideal control instrument.

21-610 The 21-610 is completely self-contained, needing only 110 volts and a small quantity of cooling water for operation. Moderately priced, easily movable, and economical to operate, the 21-610 is industry's ideal instrument for chemical research, process control and leak detection.

CEC Service Engineers quick change of ion analyzers (right) adds flexibility to Consolidated's two process monitoring mass-spectrometers. A cycloidal focusing analyzer assembly of the 21-620 type is being mounted in the vacuum rack in place of the Diatron analyzer of the 21-610.

The basic instrument can be augmented by many available accessories, thus broadening its application scope. At the far right, are a gas or light-liquid sample inlet system and chart recorder.



Consolidated Engineering
CORPORATION
300 North Sierra Madre Villa, Pasadena 15, California

Sales and Service through **CEC INSTRUMENTS, INC.,** *a subsidiary with offices in: Pasadena, Atlanta, Chicago, Dallas, Detroit, New York, Philadelphia, Washington, D. C.*

ANALYTICAL INSTRUMENTS FOR SCIENCE AND INDUSTRY

Investigate the application of industrial mass-spectrometry to your business. For full details about CEC's two companion process monitoring mass-spectrometers, send for Bulletin CEC 1824A-X6.

~~MILLS PLASTIC~~ BUTYRATE III does jobs metal pipe can't do. Often cuts installation costs 50% and more

Mills Plastic III pipe weighs only about 1/10 as much as metal pipe of the same diameter, yet it takes on the toughest jobs. It speeds installations amazingly because it can be cut with an ordinary hand saw, and can be quickly joined with Milex fittings and Mills Plastic III Solvent. (The simple technique is shown at right. Flange adapter unions are available to adapt from S.W.P. sizing to iron pipe thread where required. Ask your distributor for details, or write for new booklet describing all Continental Mills Plastic piping, tubing and fittings.

PETROLEUM — Here's the ideal pipe for refinery discharge, crude oil, sour crude, salt water and natural gas.

UTILITIES — Easily installed in corroded gas lines by push- or pull-through methods. Eliminates trenching and repaving.

INDUSTRY — Successful where corrosive liquids or mineral depositions damage other pipe. Smooth walls increase flow rate.

AGRICULTURE — Installing stock watering lines, sprinkler systems and irrigation lines becomes a one-man job with Mills Plastic III.

1. Wipe pipe end with Mills Plastic III Solvent.

2. Wipe inside of fitting with Mills Plastic III Thinner.

3. Insert the pipe end into the prepared slip fitting.

4. The job's done. Pipe can be handled in minutes!

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MILLS PLASTIC PIPE DIVISION
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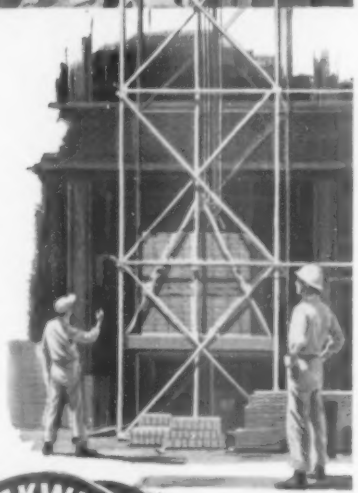
MUSCLES OF STEEL
took the load off his back

Sweat and a strong back just aren't enough when it comes to meeting the stepped-up demands of modern construction work. Today's contractors and builders call on *muscles of steel*—sturdy wire rope—to lift and carry their heavy loads.

Supplying these *muscles of steel* to the giant that is American industry is our big job here at Wickwire—a job that has commanded our vigilant care and painstaking quality control for over half a century.

In the mines and the quarries. In the logging camps and the oil fields. On construction and highway projects. With the fishing fleets and in materials handling. Wherever wire rope is used, Wickwire Rope has earned an outstanding reputation for efficiency, utmost safety, long economical service and unfailing reliability.



every industry benefits from wire rope

WICKWIRE ROPE

CFI PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

2487

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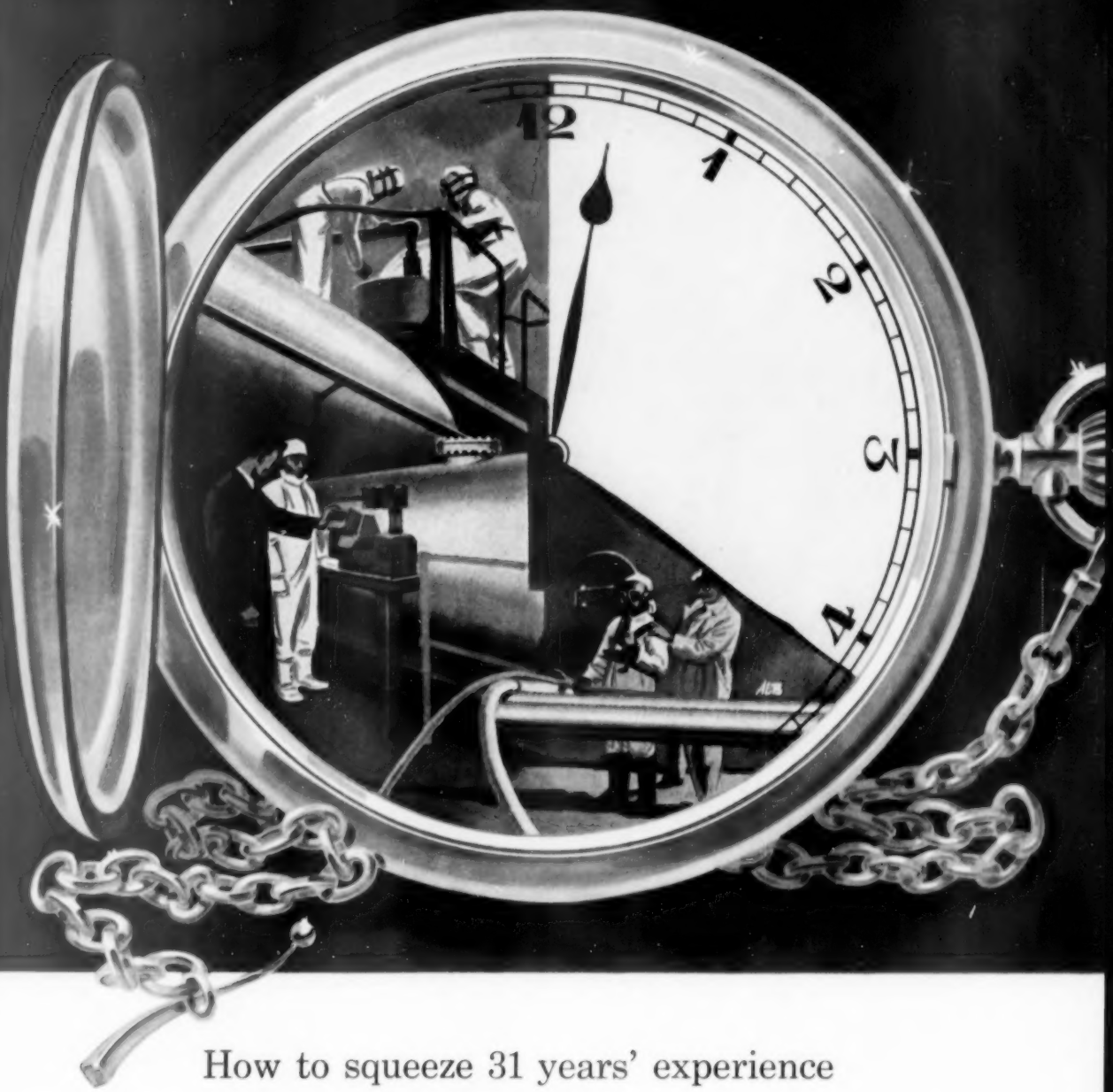
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Endicott (Pa.) • New Orleans • New York • Philadelphia



How to squeeze 31 years' experience into 21 minutes

We have yet to find an oil-company executive who doesn't put the safety of the people in his plant above every other consideration. And this, in large part, explains the remarkable safety record of the industry.

As part of the petroleum industry, we've shared this concern for employee safety for more than 31 years. To help you teach your employees how to handle "Ethyl" antiknock compound, we've developed demonstrations, live shows, charts, booklets, and other educational aids.

Now, with the expansion of the petroleum industry, the need for training new employees has so increased that we have streamlined and expanded our safety program. The core of our new program is a series of five unforgettable "how-to" movies. Each film will squeeze into approximately twenty-one minutes all the things we have learned about the various phases of safety.

The first film of the program—a color animation—covers the operation of a mixing plant. Since its release some months ago, it has become an important

(Continued on next page)

Printed in U. S. A.

(Continued from preceding page)

part in the personnel training of many companies. Our second film, entitled "Safety Precautions and Medical Regulations," is also in color and will be ready for release shortly.

Any of our safety engineers will welcome the opportunity of discussing with you how these films may be fitted into your own safety program. More films are planned for the future—each to run about the same length of time and each to cover a different phase of working with "Ethyl" antiknock compound.

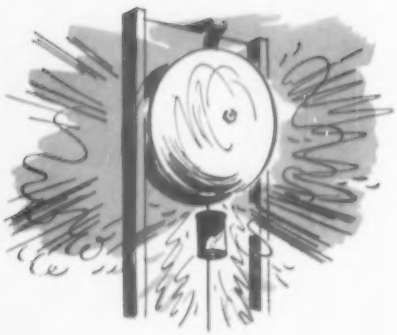
To our way of thinking, safety service is one of the most important services we render our customers. Every year brings a fresh crop of young, inexperienced workers who must be taught to believe in accident-proof methods. And, of course, the interest of the experienced workers in playing it safe must be maintained at all costs.

We share with the petroleum industry the firm conviction that people are its greatest investment. We are confident that our new training tools will enable our safety engineers to assist you in doing an even better job of protecting that investment in the future.

ETHYL CORPORATION

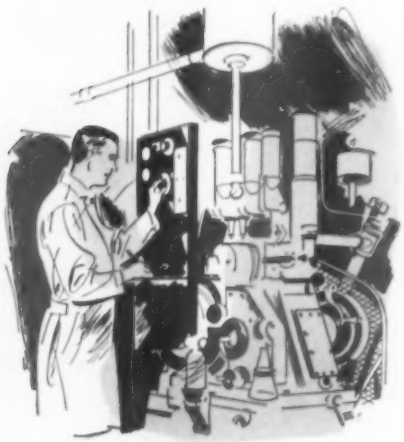
NEW YORK 17, NEW YORK

WORTH NOTING



Ethyl's national advertisements promoting your best gasoline are consistently among the best-read advertisements in the magazines in which they appear!

More than 15,000 gasoline samples are tested at Ethyl's five gasoline testing laboratories each year to furnish refiners with accurate gasoline quality reports.



The "all weather" room at Ethyl's Detroit Research Laboratories can duplicate nearly any temperature, humidity and wind condition encountered in car operation.

Ethyl service is backed by 31 years of antiknock experience

REPUBLIC
makes good hose

Hose around a drilling rig is like tires on a car. You want the best, but you don't always get the best because you simply haven't time to investigate.

So the availability of top quality hose becomes a J&L responsibility. Our field men observe and discuss hose performance on rotary rigs everywhere.

We prefer Republic, and without prejudice. There are many good brands on the market, but you can't get around that patented coupling on Republic Champion rotary hose – the higher the pressure the tighter the seal. And you can't get around the quality Republic builds into any hose . . . rotary, vibrator, suction.

For safety, for economy, and for the pure satisfaction of owning a premium product, buy your next hose from J&L.

Specify REPUBLIC *for better V-Belts, too.*

J&L STEEL

"...here's MY warehouse!"

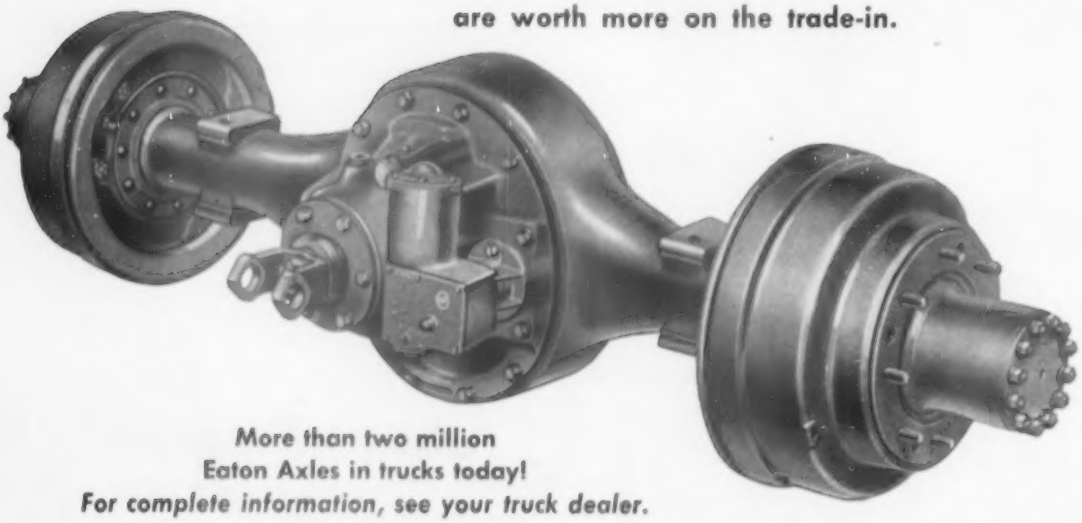
Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION – TULSA, OKLAHOMA
Serving The United States and Canada

PESA
PARTNERS IN PETROLEUM PROGRESS

Eaton 2-Speed Axles

SAVE MONEY MAKE MONEY for Truck Operators

Eaton 2-Speed Axle trucks make more and quicker full-load trips—operating cost is lower, upkeep is less. Trucks last longer, earn more, are worth more on the trade-in.



More than two million Eaton Axles in trucks today!
For complete information, see your truck dealer.

EATON — AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

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TOP-PRIORITY SHIPMENT

The sturdiest pump may eventually need a replacement part, the strongest pump suffer accidental damage. In the Gaso plant, this situation is an emergency that calls for same-day shipment of parts, via fastest possible route from diligently maintained stocks. Cutting down-time to the bone is another example of interest that extends throughout the long, long life of Gaso Pumps.

Portable Pumping Unit with Fig. 1654 Gaso Pump

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EXPORT OFFICE: 149 Broadway, New York

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GASO PUMPS

for every oil industry need

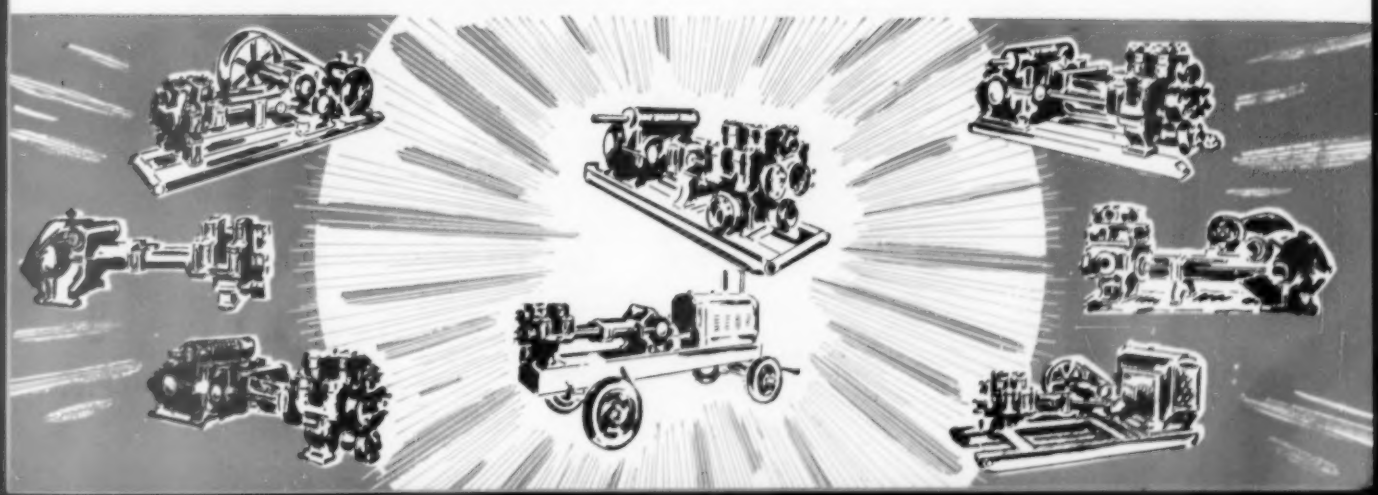


PHOTO COURTESY STEWART & STEVENSON SERVICES, INC., HOUSTON, TEXAS

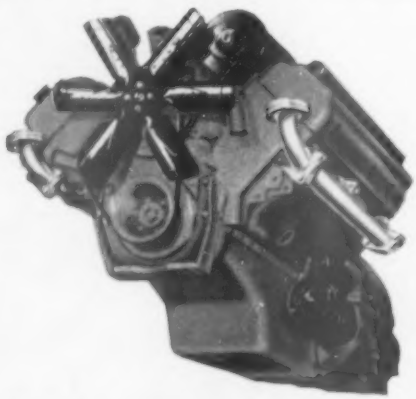
quad power unit extends advantages of **CHRYSLER** *Performance and Economy to new fields*

Here's Chrysler Power at work in the South Texas oil fields. This time it is four Chrysler Model 20 Industrial V-8 Engines working together as a single unit in a Stewart & Stevenson Quad Power Unit, in turn driving a mud pump. This particular Quad has supplied mud pump power for the drilling of ten oil wells in the eight months it has been in use.

You see Stewart & Stevenson Quads in other fields, too, but nowhere do they encounter tougher jobs than pumping mud—or more important jobs either. The continued flow of mud down the hole being drilled is absolutely necessary if drilling is to continue uninterrupted. That's because mud serves several very important functions: it lubricates the drill bit, it removes bit cuttings, it seals the walls of the hole and it provides weight to prevent blowouts.

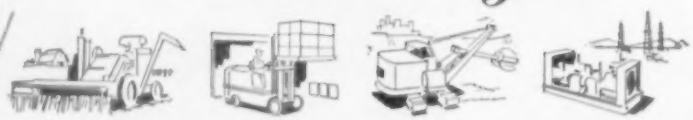
Pumping mud requires great power on a continuous basis, power that can "roll" with the heavy pulsating motion of the pump. The 331 cubic inch displacement Model 20 Engine is ideal for a multiple-engine installation. It meets the demand for high horsepower. It is a compact engine, easy to install, low in initial cost, and economical to operate and maintain. Parts are readily available, and at a fraction of the cost of competitive equipment. Each engine is supplied with a Chrysler gyrol Fluid Coupling which absorbs shock loading, thereby enabling smooth transmission of power from all four engines to the common power output shaft. One or more of the engines can be clutched out if less than maximum power is required.

Check your power needs with a Chrysler Industrial Engine Dealer. Ask him about optional equipment too. Remember, Chrysler Power is not expensive. Production-line methods adapted to specialized industrial engine building provide a custom-built engine at mass-production prices. If you prefer, write: ***Dept. 148, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***



CHRYSLER *Industrial Engines*

HORSEPOWER WITH A PEDIGREE



AGRICULTURE • INDUSTRY • CONSTRUCTION • OIL FIELDS

AIR COOLED MOBILE COOLER

WATER COOLED STATIONARY OR MOBILE COOLER

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YOUNG offers a complete cataloged line of TORQUE CONVERTER COOLERS

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. . . for mobile and stationary applications up to 600 hp. Applications above 600 hp. to special design

Now Young supplies industry the first catalog ever issued on a complete stock line of Torque Converter Coolers. These coolers are engineered for any *mobile* or *stationary* application from 50 to 600 hp . . . for oil-to-air or oil-to-water cooling. Young air cooled *mobile* oil Coolers are designed for 150 and 300 hp engines. *Stationary* type oil-to-air Coolers are available in 4 models; OCS 175, 300, 450 and 600 for engines from 100 HP up. Also, 11 standard water-cooled shell and tube type Coolers are built for *mobile* or *stationary* application. Shipment from stock makes possible quick delivery at lower unit cost. For further details see your nearest Young Representative.

Send today for the FREE new Young Torque Converter Cooler Catalog No. 1054. It contains product features and illustrations, dimension and performance data on the entire Young Line.

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Application.

YOUNG

Heating, Cooling, Air Conditioning Products for Home and Industry.

YOUNG RADIATOR COMPANY
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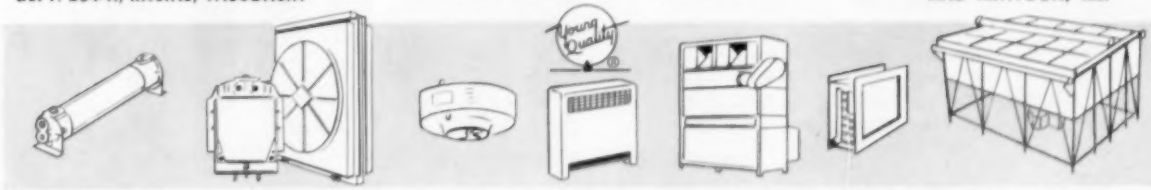
Other Young Radiator Company Products:

PLANTS AT RACINE, WIS. AND MATTOON, ILL.



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ADDED STRENGTH

JONES has a way of adding strength and fatigue resistance to selected steels. In a special machine, the peening action of thousands of round balls impart a condition of compression to a scale-free surface—smooth it for painting in the distinctive green compound.

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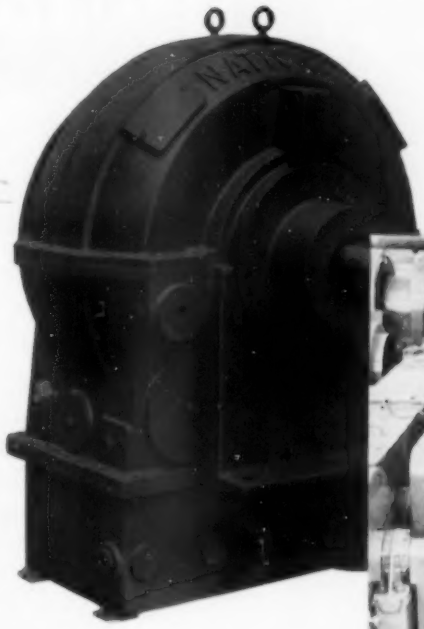
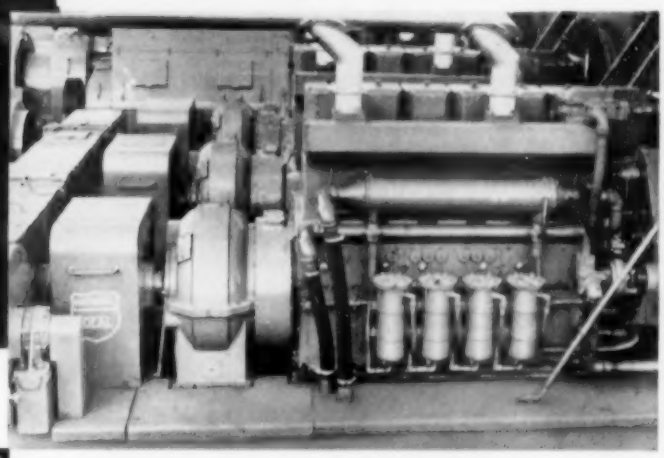
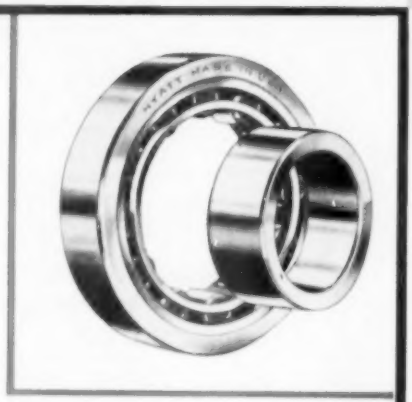
LOOK FOR THE GREEN RODS

Smoothing the path of power . . .



NATIONAL torque converters





HYATT roller bearings

Oilmen everywhere are investigating the new National Torque Converters. And it's easy to understand.

The ability of the torque converter to isolate torsional vibration, and to absorb sudden and severe impact load, provides smooth, shock-free power transmission, which greatly extends the life of both the engine and the driven equipment.

It's easy, too, to understand why Hyatt Roller Bearings are being used by National in building these converters. Like most equipment builders, National has learned by experience that Hyatts are always outstanding in life, load capacity and operation.

HYATT

STRAIGHT ROLLER BARREL ROLLER TAPER ROLLER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

THESE TWO EXAMPLES SHOW YOU

What Nordstrom Means by "Lubricaut

Nordstrom three-way Transflo valves on relief service at top of propylene tower separating propylene from propane.

TYPICAL NORDSTROM REFINERY APPLICATIONS

- Catalytic Polymerization
- Crude Topping and Vacuum Distillation
- Fluid Catalytic Cracking and Gas Recovery
- Distillate Recovery in Cycling Plants
- Duo-Sol Solvent Extraction
- Houdriflow Catalytic Cracking and Gas Recovery
- Light Ends Fractionating
- Thermal Cracking
- Phenol Extraction
- Propane Deasphalting
- Cycloversion
- Delayed Coking
- Girbotol Process
- Propane Dewaxing
- Hydroforming Process
- Naphtha Polyforming
- Solexol Process
- Solvent Dewaxing
- Thermal Reforming

Nordstrom has compiled a series of specification sheets for each of these processes, showing recommended materials, pressure classes, lubricants and valve figure numbers. Ask your Nordstrom sales engineer to review them with you.

TYPICAL NORDSTROM PROCESS INDUSTRY APPLICATIONS

- Beverage Plants
- Cement Plants
- Chemical Plants
- Explosives
- Food Plants
- Gas Plants
- Ice and Refrigeration
- Paint and Lacquer
- Paper and Pulp
- Pharmaceuticals
- Power and Steam Plants
- Rubber Plants
- Sewage Plants
- Smelters and Mines
- Soap Factories
- Steel Mills
- Sugar Refineries
- Synthetic Ammonia
- Synthetic Fibers
- Synthetic Plastics
- Synthetic Rubber
- Tanneries
- Textiles and Dyes
- Water Works

The new Nordstrom Corrosion-Resistant Valve Bulletin V-217 will make it easy for you to fit the right valve to each service. Write for a copy, Rockwell Manufacturing Company, Pittsburgh 8, Pa., or ask your Nordstrom sales engineer.

-Sealed for POSITIVE SHUT-OFF"

Here are two typical Nordstrom valve process applications—one is a propylene tower, the other a dry hydrogen line.

They illustrate an important point in specifying valves for process service . . . if really tight shut-off of hard-to-hold gases or fluids is important, no valve can do the job better than Nordstrom.

Why? Because Nordstrom is the original lubricated plug valve. Nordstrom is the valve with the extra seal of plastic lubricant around the valve ports to check seepage of even the lightest, most penetrating substances.

That, of course, means greater safety, and greater economy, too, because when leakage is prevented, valve life is far longer. And most important, it means uninterrupted operation of continuous process units—no down-time for avoidable valve repairs.

The same lubricant that seals, also keeps the valve ready to operate in an emergency.

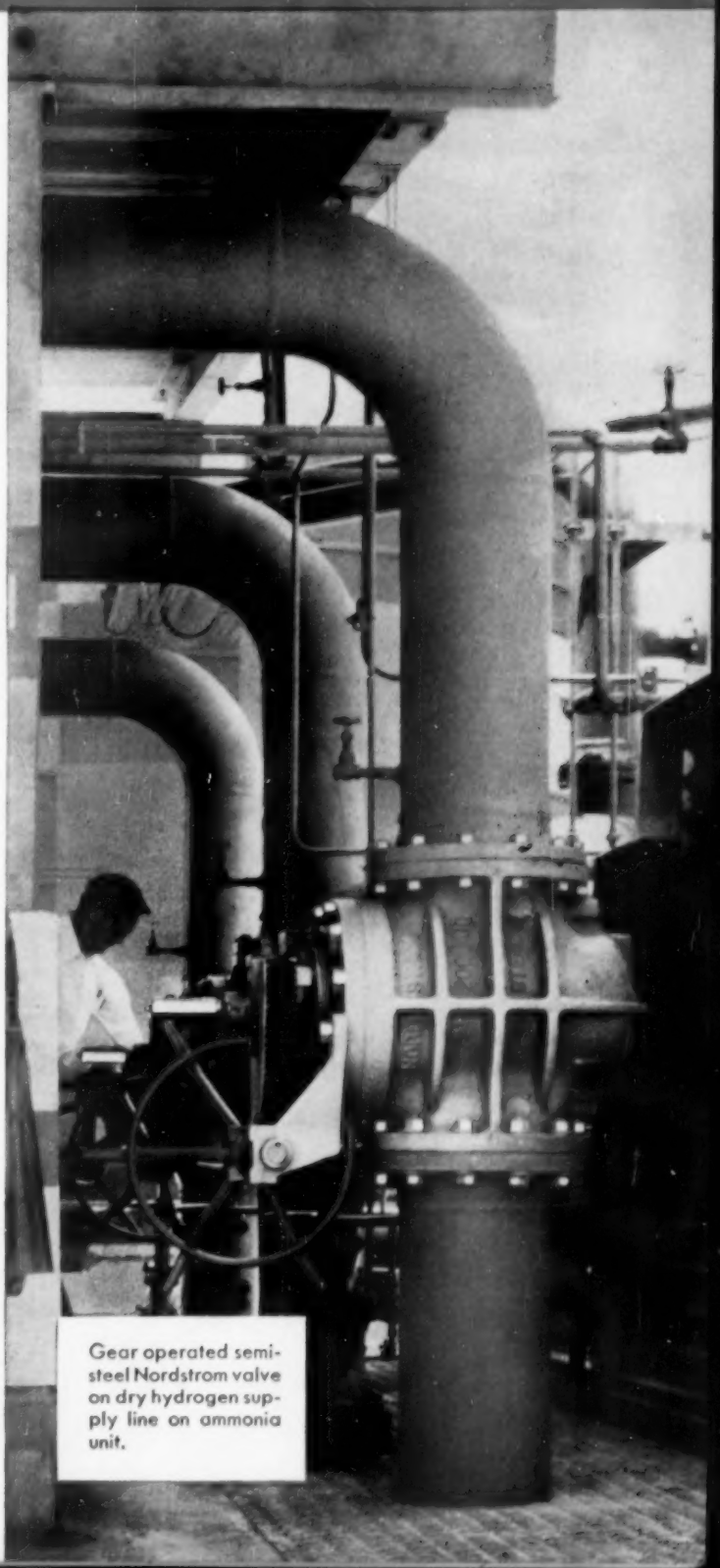
Nordstrom valves are built in a wide range of sizes, pressures, special metals and body designs for the process industries, including three- and four-way designs for batching, blending and switching. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited

ROCKWELL- Nordstrom VALVES

Lubricant-Sealed for Positive Shut-Off

Another Rockwell Product



Gear operated semi-steel Nordstrom valve on dry hydrogen supply line on ammonia unit.

NOW

you can operate small valves economically & safely

with Limitorque® REMOTE CONTROL

The new SMA-00 and SMA-000 LimiTorque Valve Control is the latest and most advanced method of operating small valves, ranging from 1½" up to 8" in diameter. These units provide complete safety to workmen, by eliminating the need of climbing to high or hazardous locations for manual valve operation. The valve operating parts are protected by two limit switches ...One provides uniform valve seating thrust, giving positive protection to the parts from overload. The second switch is the geared limit, which controls the stem travel for both directions.

SMA-00 and SMA-000 LimiTorque Valve Controls offer an extremely economical, and simple method of motorizing smaller valves. These Operators can be readily applied to all types of Valves: Gate, Globe, Plug and Butterfly . . . and may be had to actuate by a wide range of power sources including Electricity, Hydraulic Pressure, Natural Gas or Air.

For full details and information regarding these new LimiTorque Valve Controls, write for latest Bulletin.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls

UNIBOLT

Flow-rated "X" beans

Christmas tree equipped with UNIBOLT Flow Manifold, consisting of UNIBOLT Tee, Wing Valve and Positive Choke Body.

YOUR INSURANCE AGAINST HARMFUL OVER-PRODUCING

UNIBOLT Flow Rated X-Beans, provide control of the flow of fluid or gas with a degree of accuracy never before attained. They are drilled in increments of 5 percent and 10 percent of well flow, rather than in increments of 1/64-inch, and are individually flow-rated to assure accuracy.

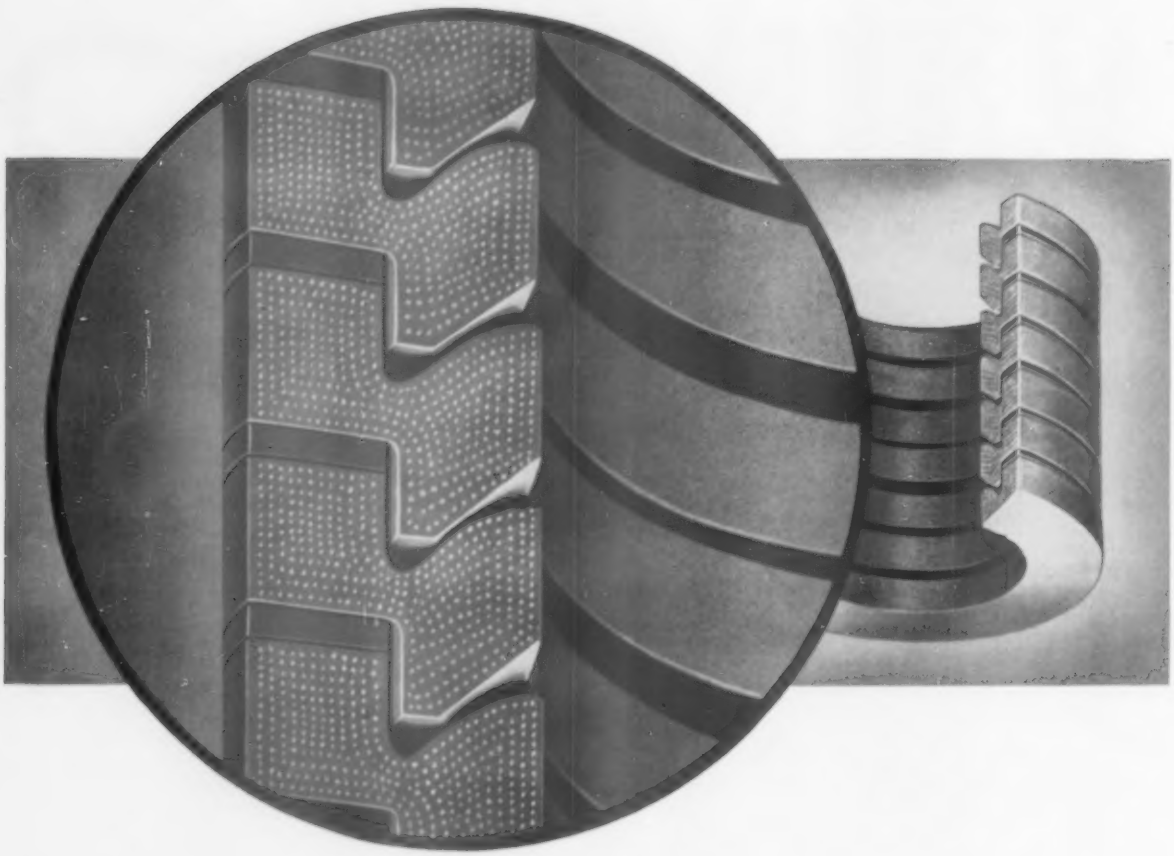
If, for example, a well produces 10 bbls. through a conventional 5/64-inch choke, to increase the choke to the next largest fractionally drilled size, 6/64-inch, would increase the production to approximately 15 bbls. On the other hand, a well that produces 10 bbls. through a size X-23 UNIBOLT X-Bean would produce only 11 bbls. through the next largest size X-Bean, X-24; 12 bbls. through an X-25, and so on.

This accurate control of production is a safeguard against the harmful effect of periodically pulling a well too hard in order to make its allowable.

GAS PRODUCERS are benefiting from the use of "X" Beans because the wells can be set with a positive choke for any desired rate of production.

THORNHILL UNIBOLT CRAVER CO.

P. O. BOX 1184 • HOUSTON, TEXAS



R/M "Vee-Square" mud pump packings need no sensitive gland adjustments

For heavy-duty service in the oil fields, you won't find better packings than R/M "Vee-Square"® Rings. They seal efficiently; are easier on rods; and, unlike ordinary V-ring packings, do not require sensitive, finger-tip adjustment.

Take a look at the cut-away view of their construction. Note the solid square section—it absorbs gland pressure, keeps the packing from rolling and riding the rod. Note the V-design—it assures automatic sealing. Note the soft rubber cushion between the rings—it prevents blow-by and compensates for any overtightening.

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS AND SELLS THEM ONLY THROUGH AUTHORIZED DISTRIBUTORS

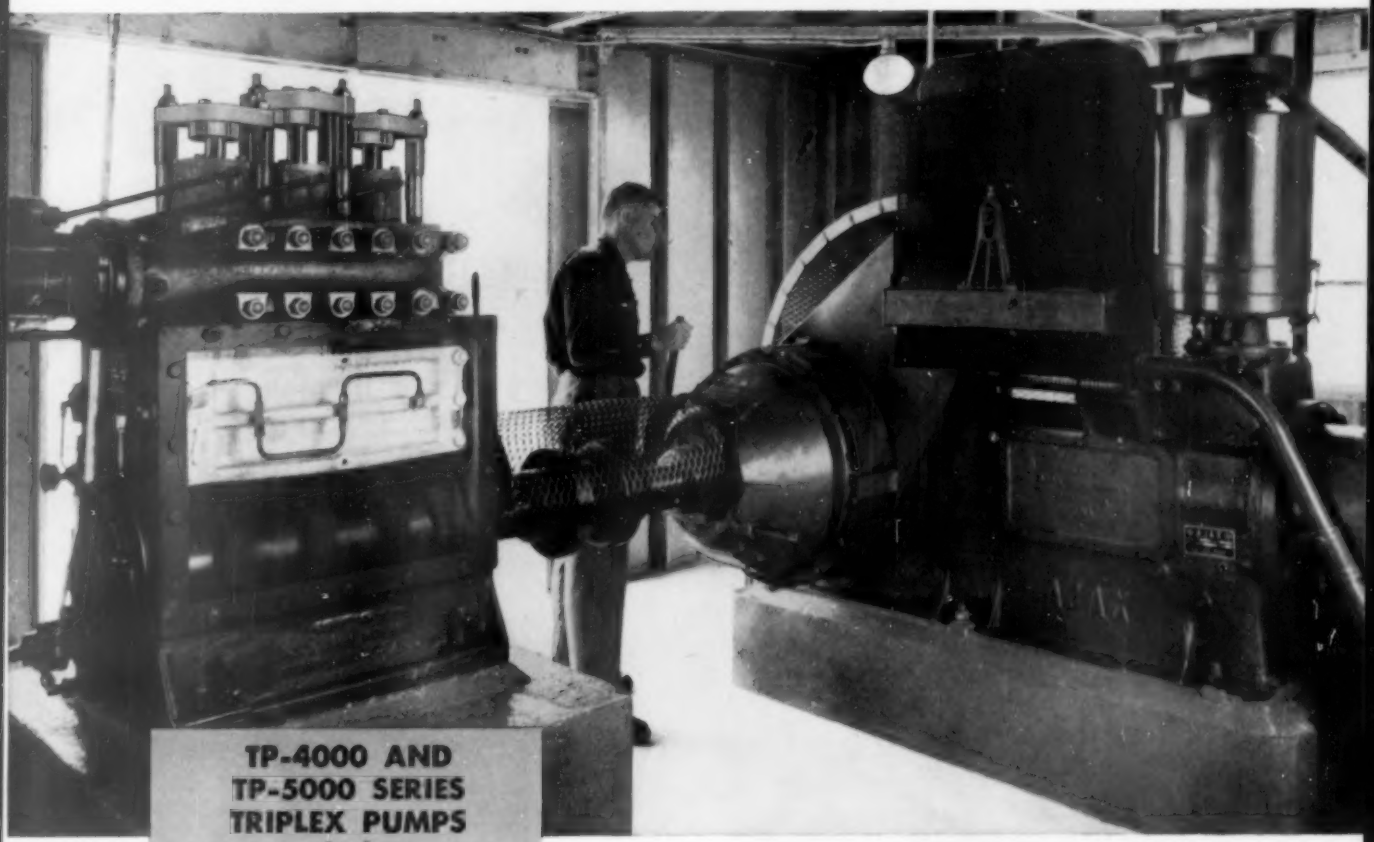
R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

If lowering your mud pump rod costs interests you, write today for our free bulletin on R/M "Vee-Square" Packing Rings.

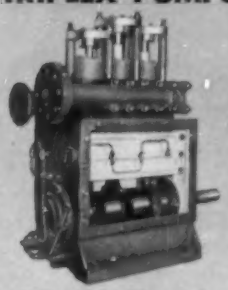
FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

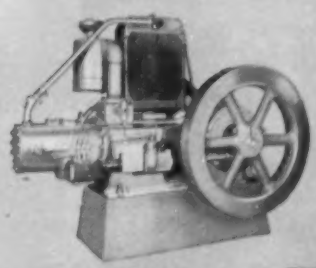
For your ***FLUID INJECTION*** investment



TP-4000 AND TP-5000 SERIES TRIPLEX PUMPS



DP-70 11 x 14 PUMPING ENGINE



- **MAXIMUM PERFORMANCE**
- **MAXIMUM VALUE with**

Ajax

PUMPS AND ENGINES

Unceasing dependability under constant load is the hallmark of AJAX Pumps today, as it has been for AJAX Engines over 77 years in oilfield service. Ajax Engines will drive any pump — Ajax Pumps will take any drive. Put them together, and you get ALL-AJAX value . . . the most in the field for your money! *Check it over with your Supply Man.*

PESA

AJAX

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

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Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

A Great New CLEVELAND

The Model 240

DIGS 20″ - 36″ WIDE, DOWN TO 6′3″ DEEP

● This powerful new trencher possesses all the famous time-proved CLEVELAND advantages—plus valuable new features that make it the finest trencher of its size and capacity ever built.

It is built to deliver—*is now delivering*—outstanding digging performance . . .

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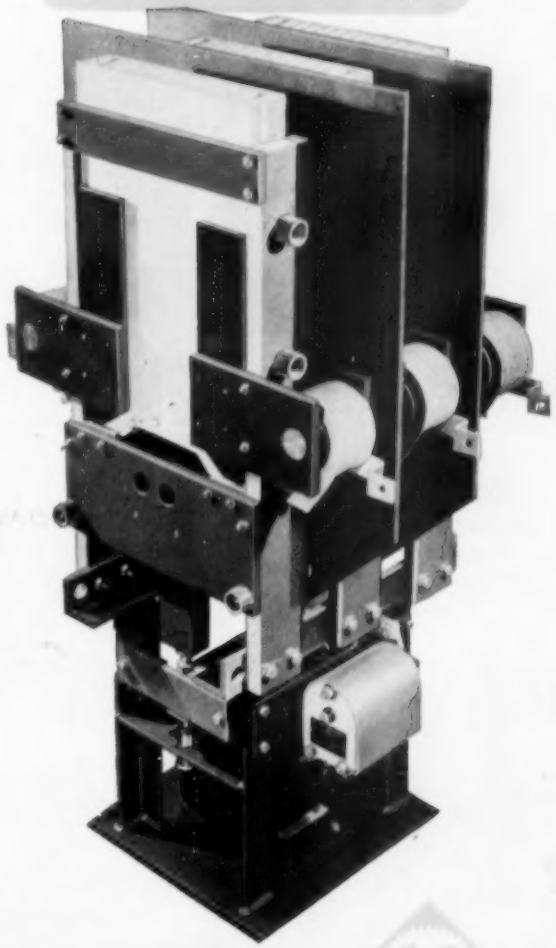
Built for SEVERE DUTY

frequent starting • inching • reversing • dynamic braking

ALLIS-CHALMERS
Type 256
AIR CONTACTOR
FOR 2300 TO 5000-VOLT MOTOR CONTROL



Durability and long-term dependability were given prime consideration in the design of the Allis-Chalmers Type 256 air-break contactor. As a result, the roughest repetitive duty becomes routine — contact operations are actually numbered in the millions with a minimum of servicing.

DESIGN FEATURES

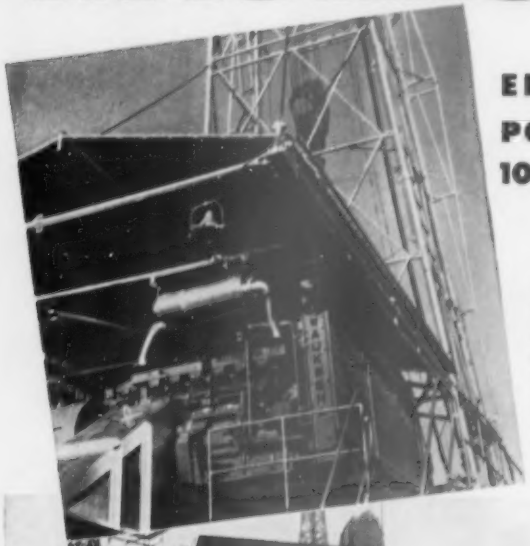
By utilizing a simple vertical motion and double break contacts, troublesome maintenance factors, such as mechanical linkages, turning shafts, shaft bearings and flexible leads, have been eliminated. From the operation standpoint, two gaps in series cut arc voltage in half. Rapid arc extinction is further facilitated by magnetic blowouts at each gap, operating with arc chutes designed to take full advantage of dual blowouts.

In Allis-Chalmers Type H high voltage starters, Type 256 air-break contactors — along with meters, overload relays, current limiting fuses, auxiliary switches — are coordinated to meet heavy duty demands — to provide high capacity interruption and complete protection for man, motor and machine. For complete information see your nearby A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletins 14B6410B and 14B7303.

A-4325

ALLIS-CHALMERS

World's Finest Oil Field Power
WAUKESHA



ENGINES and POWER UNITS 10 hp. to 600 hp.

Send for

BULLETIN 1079

It gives complete line of Waukesha Oil Field Engines for gas, gasoline, normal Diesel, or turbocharged Diesel operation—to 600 hp.

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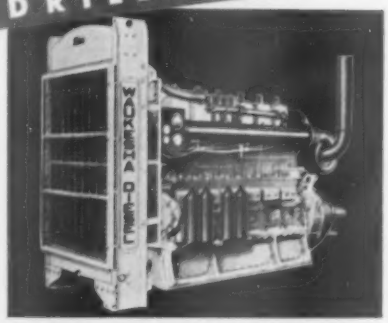
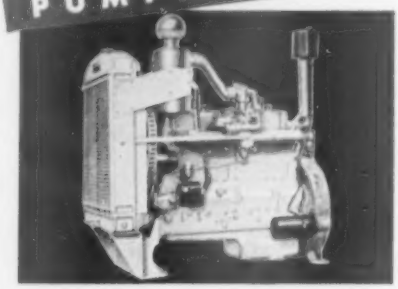
DRILLING



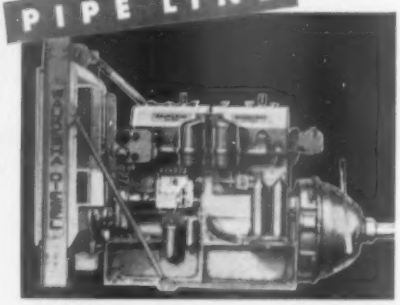
LRDBSU Turbocharged Diesel Unit — six cylinders, 8½-in. bore x 8½-in. stroke, 2894 cu. in. displacement, 526 hp at 1200 rpm, maximum.

PUMPING



145-GZBU Gas Power Unit — six cylinders, 5⅜-in. bore x 6-in. stroke, 817 cu. in. displacement, 176 hp at 2000 rpm on natural gas.

PIPE LINE



NKDBU Normal Diesel Power Unit — six cylinders, 7-in. bore x 8¼-in. stroke, 1905 cu. in. displacement, 274 hp at 1200 rpm, maximum.

TRUCKING

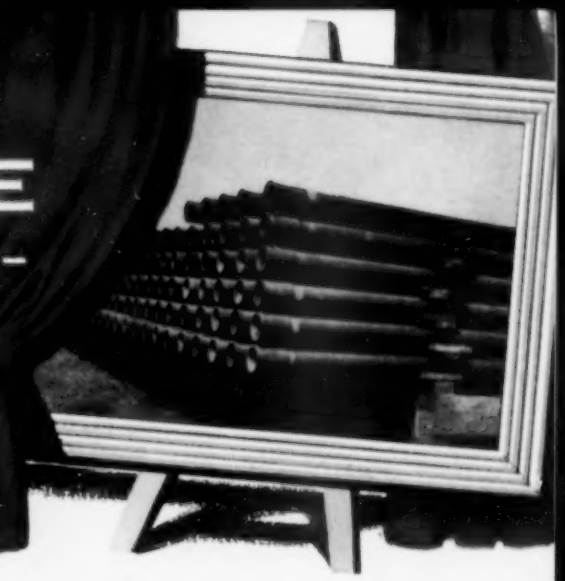
148-DKBS Turbocharged Truck Diesel — six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, 280 hp at 2100 rpm.

UNIVERSALLY RATED . . .

A MASTERPIECE

IN THE ART OF STEELMAKING—

NATIONAL SEAMLESS



DEEP well drilling demands the utmost in strength of tubular materials. They must be worked hard, deep—must resist fatigue, twisting action, collapse. And they must always be capable of meeting the higher stresses of tomorrow.

National Seamless Oil Country Tubular Products are acknowledged the world over as the most ideal material for deep well work, from the standpoint of both steel quality and method of manufacture—for, in effect, this very method of manufacture is in itself a severe test of the uniformity and strength of the steel.

Manufacturing a seamless tube by the piercing method is one of the most difficult forging operations in the steel industry. Only steel of the very best forging properties and of high uniformity can be used for the seamless process, since piercing the solid billet tends to search out any defects in the metal. Consequently, as the art of steelmaking has improved, so has the quality of the steel used for NATIONAL seamless. The result—a masterpiece of high strength, high collapse resistance, and maximum security—National Seamless Oil Country Tubular material.

Significant National Tube Developments in the Oil and Gas Industry:

NATIONAL DEOXIDIZED BESSEMER STEEL CASING AND TUBING
Especially well-suited for oil production because of its combination of high yield strength and good ductility.

NATIONAL WARM-WORKED CASING
An extremely high-strength casing possessing a uniformity of physical properties which gives it high collapse resistance and greatly increased joint strength.

NATIONAL DEEP-WELL CASING
A stronger casing than is provided under A.P.I. specifications, to meet constantly increasing depths. Because it is intended for severe service it is hydrostatically tested to 80% of minimum yield strength up to a maximum of 12,000 p.s.i.

NATIONAL (B) BUTTRESS-THREAD CASING

Developed to satisfy the need for a casing joint which will safely and economically support the weight of deep-well casing. The buttress-thread joint is comparable in strength to that of the body of the pipe.

For further information on National Tube developments in the oil industry, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

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PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

USS NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL

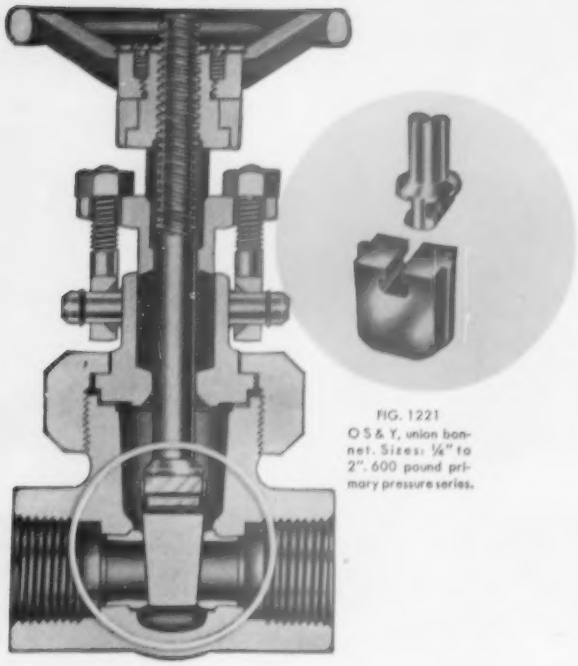


FIG. 1221
O S & Y, union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

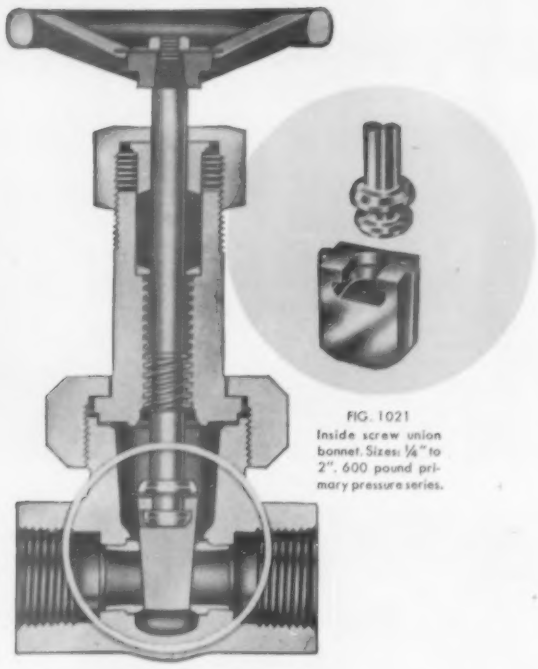


FIG. 1021
Inside screw union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

New design makes OIC forged steel gate valves the most modern line . . .

NEW: stronger stem-to-wedge connection. Improved, modern design increases pull-out strength to many times the theoretical requirement. This design distributes the pull-out load more efficiently throughout the wedge structure to meet the most stringent specifications of valve buyers in all fields.

NEW: wedges wear longer. Wedges are made of 13% chrome stainless steel for corrosion resistance. They are duracased to at least 1000 Brinell Hardness to prevent galling and excessive wear caused by frequent closures upon foreign particles in the flow.

NEW: union bonnet design is more efficient. Body-to-bonnet joint of the male-female type provides a recess for the gasket. It is contained more securely, reducing the possibility of leakage or a blown gasket.

OTHER OUTSTANDING FEATURES

Stem threads of all OIC inside screw, forged steel valves are always contained inside the bonnet. They can't possibly load up with corrosive matter which might be in the flow. This keeps the threads clean and free running, and contributes to longer stem wear.

Modern OIC Seal-Ever packing is a special composition which eliminates electrolytic action between the stem and the packing. This prevents stem corrosion in the packing area and helps maintain a leakproof seal.

Back-seating feature provides means of repacking valves while in service.

OS & Y valve gland "I" bolts are retained on trunnions by modern, more efficient, stainless steel snap rings.

Shoulder-type seat rings are expanded into the body under heavy pressure. They are accurately machined to mate tightly with the wedge for a positive seal.

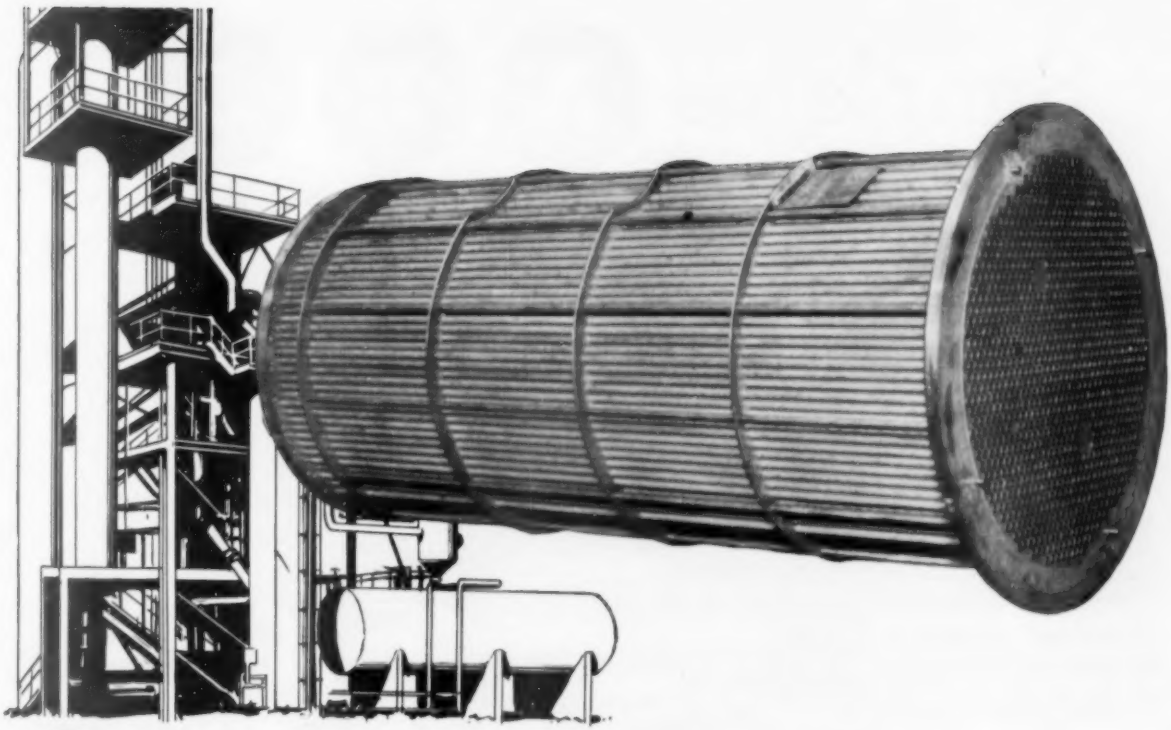
Order modern OIC Forged Steel Valves from your nearby OIC Distributor. Write and request Folder No. 195.

OIC Forged Steel Valves are also available in globes, angles and checks in a variety of trims for any service.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

OIC
FOUNDED 1881
VALVES

FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON



SINCLAIR USES REPUBLIC STAINLESS STEEL PRESSURE TUBES

● For its heat transfer equipment requirements, Sinclair Refining Company uses large quantities of stainless steel tubing. And to help fill this need, Struthers Wells, Warren, Pa., heat exchanger manufacturer, relies on Republic Steel.

Back of Struthers Wells' choice lie good reasons: Republic is the world's largest producer of stainless and alloy steels. Republic pioneered the widespread use of stainless, as well as the manufacture of stainless steel tubing. And in shell and tube equipment, Republic's more than a quarter century of experience translates itself into longer life between retubings.

Installation costs are lower, too. ELECTRUNITE Heat Exchanger Tubes are uniform. That means uniform wall thickness, without longitudinal thin spots. Uniform diameter, which means tubes slide easily and quickly through holes in drums or headers. And since tubes expand evenly, there's less danger of over- or under-rolling.

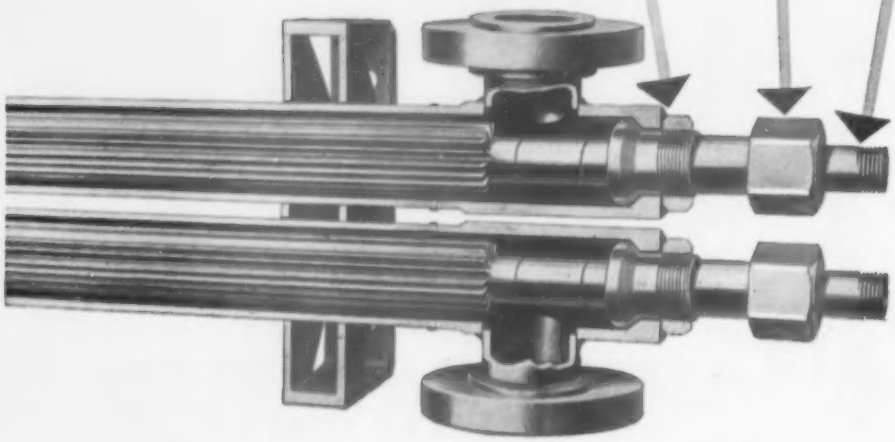
You, too, can have all these advantages by specifying Republic ELECTRUNITE Pressure Tubes on your next order for new heat exchangers or retubing. Available in carbon as well as stainless analyses. For more information write to:

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
219 East 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
REPUBLIC STEEL
ELECTRUNITE
BOILER, CONDENSER AND HEAT EXCHANGER TUBES

Simple as A B C

to assemble the head of this finned tube heat exchanger



THE G-R TWIN G-FIN® SECTION

A **CONE PLUG LOCK NUT**

B **UNION NUT**

C **MALE TAILPIECE**

These are the only parts in the complete head assembly of the G-R Twin G-Fin Section. Similar simplicity is inherent in every other feature, such as:

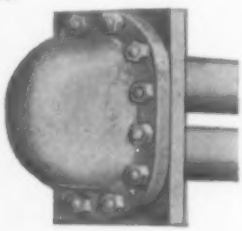
Simple Design—Consists essentially of a pipe within a pipe, without the complications of tube sheets, baffles and internal joints.

Simple Installation—These lightweight, standard, interchangeable units can be easily stacked and connected in series or parallel for the desired capacity and temperature ranges.

Simple Maintenance—Removable elements simplify cleaning of exteriors. There are no stuffing boxes to cause trouble, no rolled tube joints. Maintenance is low.

Simple Conversion—These units can be readily converted from one service to another. They are available in non-ferrous as well as ferrous alloys — can be used as heaters, coolers, condensers or heat exchangers for practically all liquids, vapors and gases.

Domed Shell Cover—This type of shell cover is particularly rugged, yet weighs only 17 pounds for the small sections and 43 pounds for the standard high capacity sections.



70,000 Trouble-Free Installations

THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS **Twin G-Fin Section**

GR-237

Lay sour crude pipe with 62% less labor cost

Easy-handling Tenite pipe means substantial installation economies. In a typical case, three men laid 4000 feet of 4" Tenite pipe a day; eight men are usually required to handle the same amount of steel pipe.

Extruded of Tenite Butyrate plastic, the pipe does not corrode under oil-field conditions. Major oil producers are successfully using it for sour crudes, salt water disposal, and in areas where electrolytic action affects steel pipe.

The extra-smooth walls of Tenite pipe resist paraffin accumulation, minimize cleaning shutdowns. For any given head loss Tenite pipe also delivers approximately 40% more fluid than clean steel pipe of the same diameter.

Pipe extruded of Tenite is made by various companies to which Eastman supplies the plastic compound. Send the coupon for further information about Tenite plastic pipe. If you need assistance in adapting Tenite pipe to your operation, our technical staff will be glad to help.

For corrosion resistance ask for PIPE MADE OF—

TENITE
BUTYRATE
an Eastman plastic

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KINGSPORT, TENNESSEE
Subsidiary of Eastman Kodak Company

EASTMAN CHEMICAL PRODUCTS, INC.
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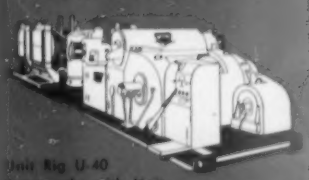
Please send me further information about TENITE BUTYRATE PIPE

NAME .....
TITLE .....
COMPANY .....
STREET .....
CITY ..... STATE .....

OGS-54

U-40 — 900 H.P.
6,000-10,000 FT.



Unit Rig U-40 Drawworks with Unit Rig Two-Engine Compound

Unit Rig U-40 Drawworks with Unit Rig Three-Engine Compound

For complete information write to —
MACHINERY DEPARTMENT
P. O. Box 189
Fort Worth, Texas

More Than Pays Its Way

Companies who operate rigs day in and day out continuously say that Unit Rig's Model U-40 "More than pays its way." They like the single package drawworks with integral selective speed transmission and the many other economy features that make drilling with Unit Rigs faster — safer — surer. The U-40 is adaptable to either direct mechanical, fluid coupling or torque converter drives and is furnished with 2 or 3 engine compounds. Let Mid-Continent Supply Company assist you on your next rig purchase.

MID-CONTINENT Supply Company

MID-CONTINENT BLDG. • FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Which car of Caustic Soda saves you the most money?

Both of these cars look alike, and their capacities are the same. Both are filled. Yet the one on top may save you $131 per car. Can you guess why?

The answer is simply that the car on top contains 73% caustic soda, while the other contains 50%.

More and more companies are specifying the higher concentration in order to save money. These savings are possible because:

1. A car of 73% contains more caustic by volume.
2. A car of 73% can be unloaded as fast as a lower concentration, thereby saving man-hours.

One Columbia-Southern customer who converted from 50% to 73% figured the savings to his company at $131 per car. Other customers who made the changeover show total annual savings ranging from $1179 to $35,100.

The amount of caustic soda you use and your location will determine how much you may save. But the point is: If you use caustic soda, you owe it to yourself to check the possible economies. Our staff will be glad to do the figuring for you—no obligation, of course. Just contact the Caustic Soda Department at our Pittsburgh office.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
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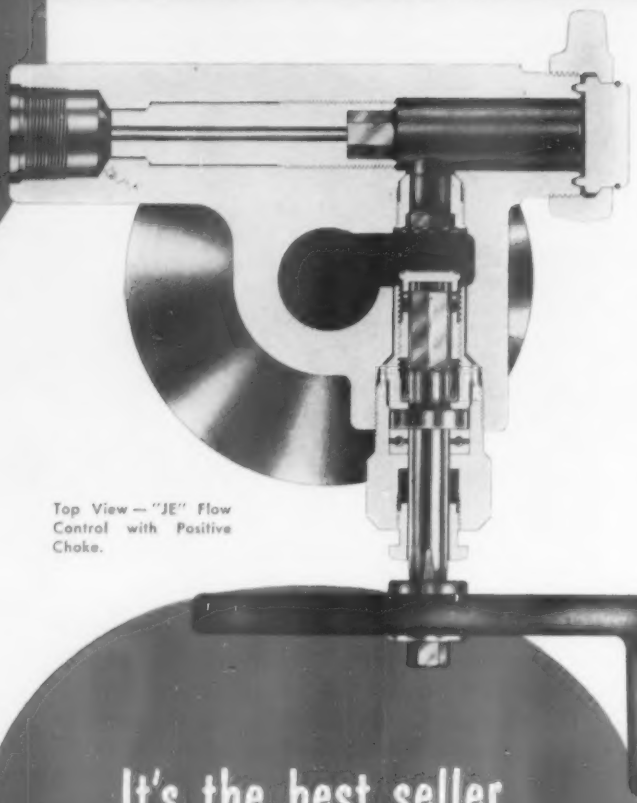
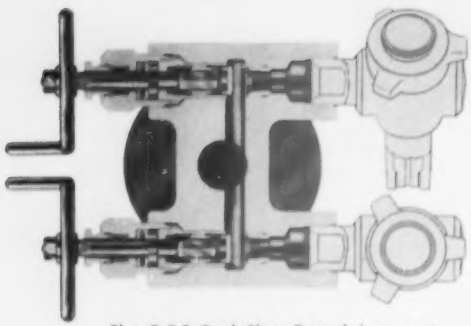
O·C·T "JE" FLOW CONTROLS

THE ONLY FLOW CONTROL ON THE MARKET THAT GIVES YOU A CHOKE AND A VALVE*



Top View — "JE" Flow Control with Positive Choke.



The O-C-T Dual Flow Control is an outstanding companion to the "JE" Flow Control units which have gained universal acceptance in oilfields all over the world. This unit replaces 13 different fittings.

It's the best seller BECAUSE It's the best buy

*Yes, this compact, easy-operating O-C-T "JE" Flow Control Unit . . . adaptable to either positive or adjustable chokes . . . is the only flow control on the market today that gives you the full advantages of both a choke and a true valve type gate assembly and seating arrangement. The valve in your O-C-T Flow Control Unit is a complete valve type gate assembly . . . with ball bearing construction to assure easy, quick operation. When you buy your next trees . . . regardless of the make . . . be sure to specify O-C-T "JE" Flow Controls. More trees of all makes are now topped with O-C-T "JE" Flow Controls than all other makes . . . because O-C-T "JE" Flow Controls give you greater dependability, easier operation and save as much as $300.00 per tree over a conventional tree wing. Available through more than 700 supply store locations.

Oil Center Tool Co.

P. O. BOX 3091, HOUSTON, TEXAS

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry

It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

- One moving part.
- No internal wearing parts.
- No valves, pistons, or sliding vanes.
- No internal lubrication.
- Low maintenance.
- Slugs of liquid entering pump do no harm.
- Non-pulsating pressure.
- Saves floor space.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
274 WILSON, SO. NORWALK, CONN.

IN SWAMP
— ON DRY LAND
— SMALL OR LARGE
INSTALLATION

PURCHASED

Electric Power

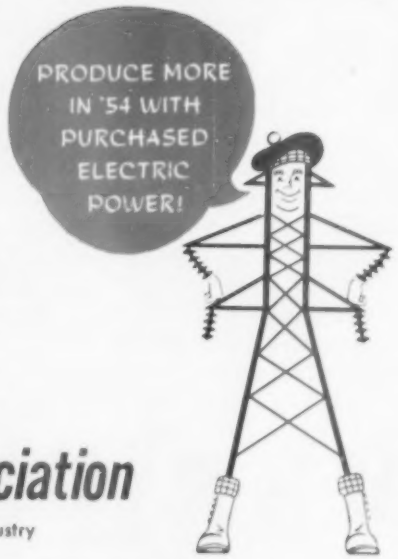
DOES IT

Cheaper

For economical, dependable, practically maintenance-free motive power the industry is relying more and more upon Purchased Electric Power. In literally thousands of installations . . . . in such diverse localities as these . . . . Purchased Electric Power furnishes dependable 24-hour-a-day service at LOWEST POSSIBLE COST!

Let Purchased Electric Power go to work for *you!* There's a Power Engineer at your nearest Electric Power Company who can give you the answer to all your power problems. Why not get in touch with him today?

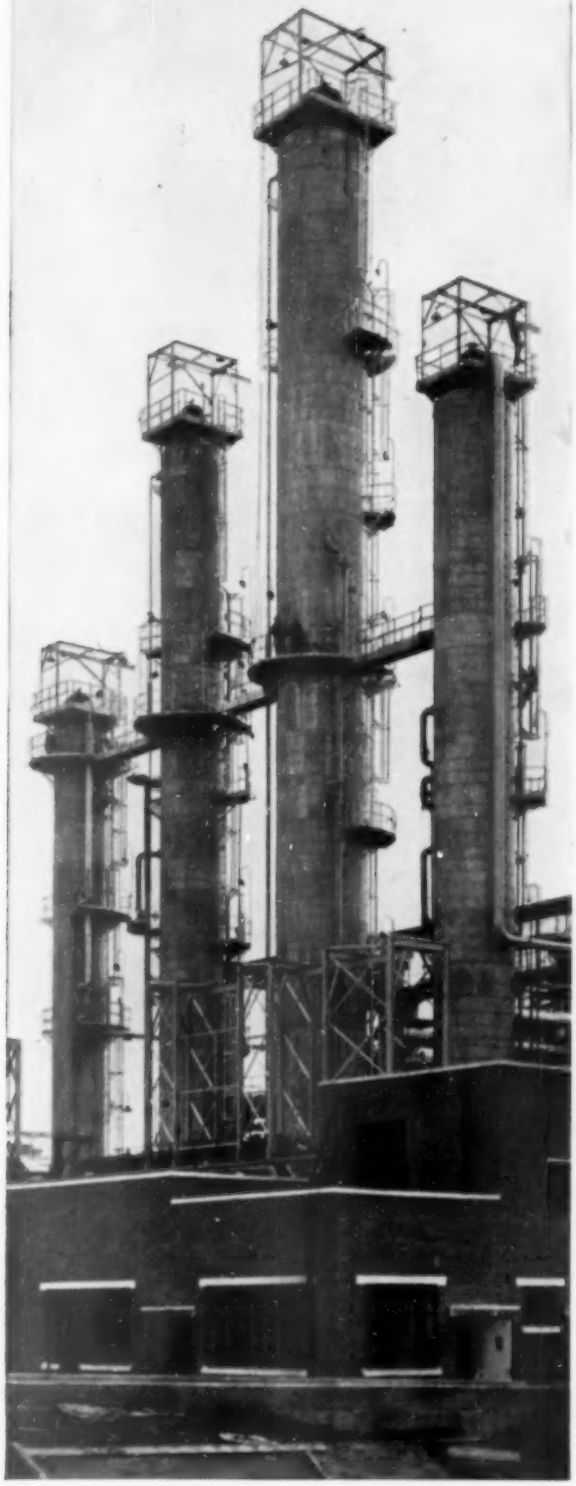
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY for more facts, or address your request to P. O. Box 2771, Dallas, Texas



Petroleum Electric Power association

ORGANIZED in the interest of greater service to the petroleum industry

GLOBAL CONSTRUCTION



PROGRESSIVE REFINERS THE WORLD OVER CHOOSE PROCON

In many parts of the globe, petroleum refiners who are planning process construction are turning to Procon, secure in the knowledge that such work will be completed on schedule and with maximum economy.

Procon crews are actively engaged on many projects in England . . . Wales . . . Australia . . . Canada . . . France . . . Belgium . . . the Canary Islands . . . Lebanon . . . Germany and the United States. Each job is being meticulously supervised by outstanding engineers, each a specialist in his own field. Complete coordination between field engineers and Procon offices insures the synchronization of shipments of materials vital to rapid and efficient completion of each job.

A typical example of how Procon meets its commitments is the UOP Platforming unit completed recently by Procon (Great Britain) Limited for Shell's Stanlow Refinery, Ellesmere Port, Cheshire, England.

This unit was completed on time because close teamwork made it possible for strategic materials to be on the jobsite WHEN they were needed.

Performance of this type is the result of careful planning, coordinated effort, and construction experience. "Built by Procon" is synonymous with expert process construction.

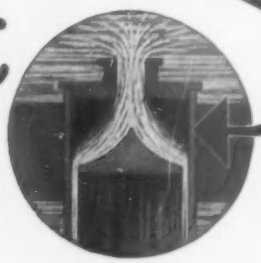
PROCON (*Great Britain*) **LIMITED**
PROCESS CONSTRUCTION
112 STRAND, LONDON, W. C. 2

IN CANADA | PROCON (CANADA) LIMITED
40 ADVANCE ROAD
TORONTO 18, ONTARIO

IN U. S. A. | PROCON INCORPORATED
1111 MT. PROSPECT ROAD
DES PLAINES, ILLINOIS

Dirty Water can't "Shut-down"...

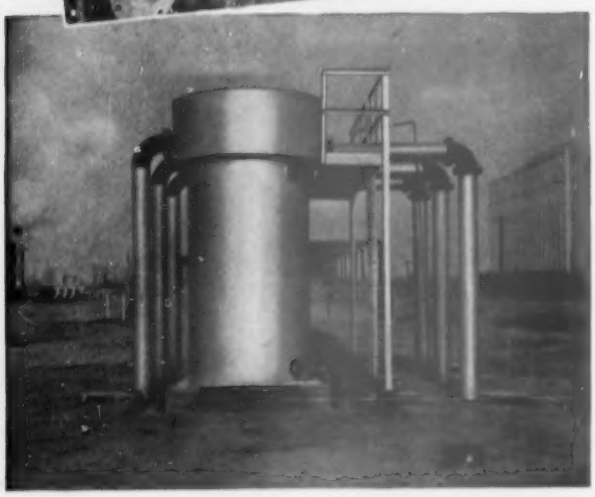
Vogt



film type exchangers

(Condensers—Coolers—Evaporators)

Patent Nos. 1,935,270 - 2,057,597 - 2,424,441



River water, well water or brackish water are all alike to this exchanger *because it can be cleaned* while in operation! The water distributing ferrules need only be removed successively for the cleaning brush or tool whereby the tubes receive additional water which sluices away the dislodged dirt.

Vogt Film Type Exchangers are operating with real economy of first cost, operation and maintenance in power, petroleum, and chemical industries. They serve as Jacket Water Coolers, Feed Water Heaters, Hydrocarbon Evaporators, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to cool or heat any liquid and to condense or evaporate any fluid.

TOP: *Four units at Newton Falls, Ohio Municipal plant cool water for diesel engines and a lubricating oil cooler.*

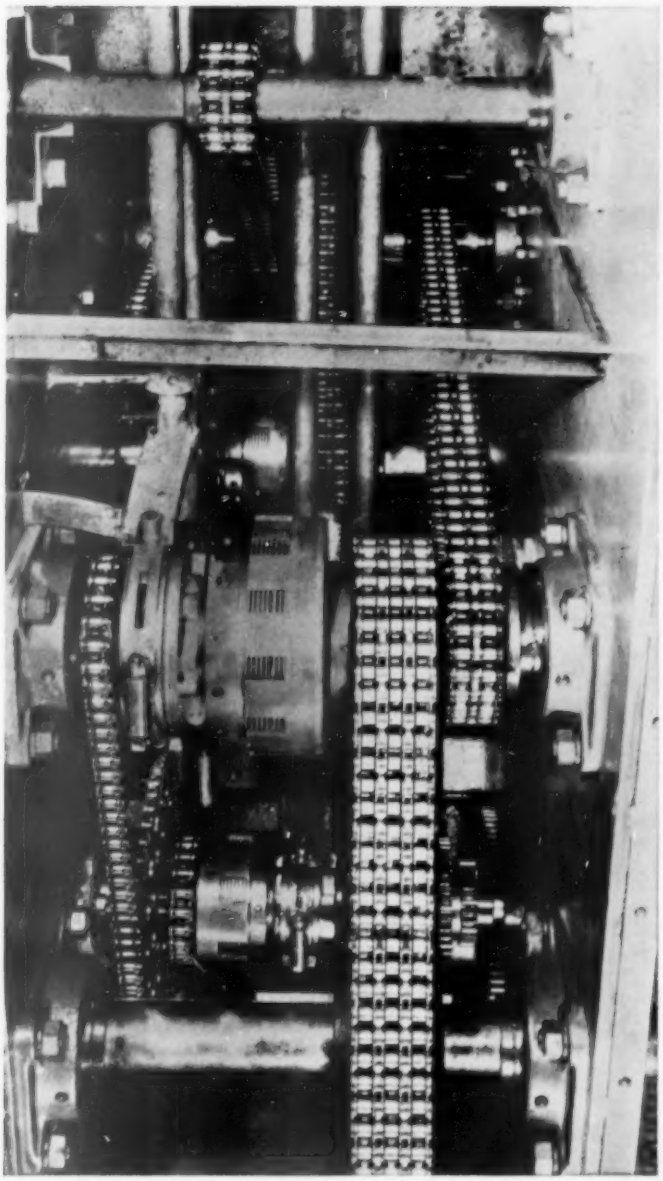
BOTTOM: *Jacket Water Coolers serving engines of 7,300 HP in the compression plant of a Western Oil Refinery.*

[Bulletin HE-7 describes typical installations of Vogt Film Type exchangers and is available upon request.]

HENRY VOGT MACHINE CO., LOUISVILLE, KY.

Branch Offices: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.

How Morse figures in a special feature of shot-hole and water-well drilling



Carey Model #3 Shot-Hole and Water-Well Drill Gear Box

The shot-hole and water-well drilling rig gear box of Carey Machine & Supply Company employs a special feature: chain with continuous travel. It is motivated by a dual-action friction clutch, and has two speeds selective from the driver's position; one for hard formation, one for soft.

The gear box incorporates single- and multiple-width Morse Roller Chains and Sprockets: Morse Roller Chain Couplings contribute to the drill's rated drilling depth of 1,000 feet, with a 6" hole.

Morse Roller Chains contribute stamina and long service life to any machine on which they are used. They are used to transmit power reliably, efficiently, and economically. They are trouble-free in operation and help reduce maintenance costs.

For off-the-shelf delivery of roller chain, stock sprockets and flexible couplings, contact your local Morse distributor. MORSE CHAIN COMPANY, 7601 Central Avenue, Detroit 10, Michigan.

Houston
Sales & Warehouse
Morse Chain Company
1312 La Branch Ave.
P. O. Box 896

New York
Morse Chain Company
50 Church St.

Los Angeles
J. W. Minder
6011 So. Central Ave.

St. Louis
Bates Sales Co.
1025 N. Sixth St.

Pittsburgh
Morse Chain Company
503 Martin Bldg.
119 Federal St.

Vancouver, B. C.
Western Equipment, Ltd.
102 Main St.

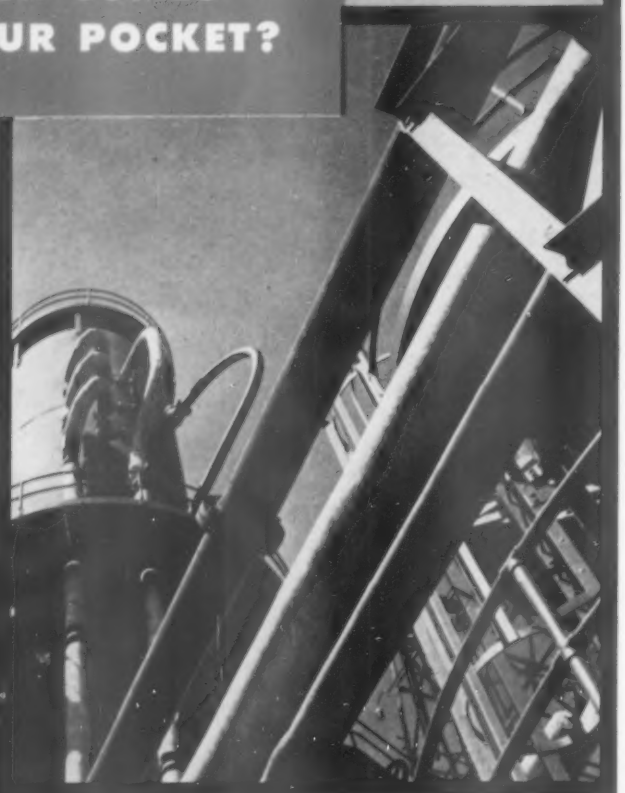
MORSE BW
MECHANICAL POWER TRANSMISSION PRODUCTS

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893

CORROSION COSTS THE OIL INDUSTRY

$600,000,000.00 EVERY YEAR!

HOW MUCH COMES OUT OF YOUR POCKET?



$600,000,000.00 is the approximate estimated annual cost of corrosion to the petroleum industry. (If you are a producer, your corrosion cost may be close to $500.00 per well per year. If you produce gas or gas condensate, corrosion may be costing you as much as $50.00 per MMCF of gas produced.) It is further estimated that the yearly cost of corrosion to the refining portion of the industry approximates $250,000,000.00, *not allowing for cost of shut-downs and lost on-stream time.*

Admittedly, the above figures are estimates. But they are based on figures supplied by the National Association of Corrosion Engineers, the N.G.A.A. Corrosion Research Committee and the API subcommittee on corrosion. It is a pretty safe bet that such figures are on the conservative side.

To further point up the importance of corrosion to the industry, the estimated cost of $600,000,000.00 per year amounts to about 27¢ per barrel of oil produced . . . nearly 10 per cent of its selling price!

Kontol organic corrosion inhibitors have proved effective as corrosion preventives in oil, gas and gas-condensate wells, gasoline plants, pipelines and refinery equipment. Kontol engineers will gladly survey your corrosion problem, and discuss preventive measures. There is no cost or obligation incurred for consultation service.

It will pay you to get all the facts on Kontol Corrosion Inhibitors. Just write or call

TRETOLITE COMPANY

A DIVISION OF PETROLITE CORPORATION

369 Marshall Avenue • Saint Louis 19, Missouri

5515 Telegraph Road • Los Angeles 22, California

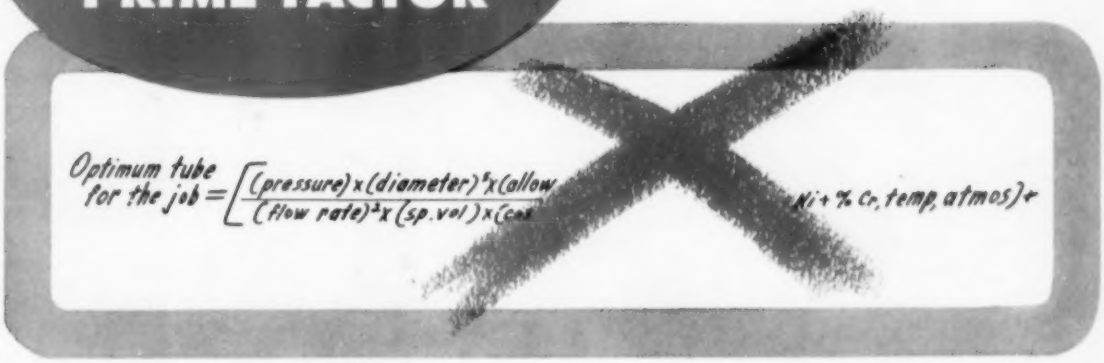
Chemicals and Services for the Petroleum Industry

DEMULSIFYING • SCALE PREVENTING • WATER DE-OILING

CORROSION PREVENTING • DESALTING • PARAFFIN REMOVING

KFR54-15

WHEN OXIDATION IS A PRIME FACTOR



Tube Selection Cannot be Reduced to a Formula

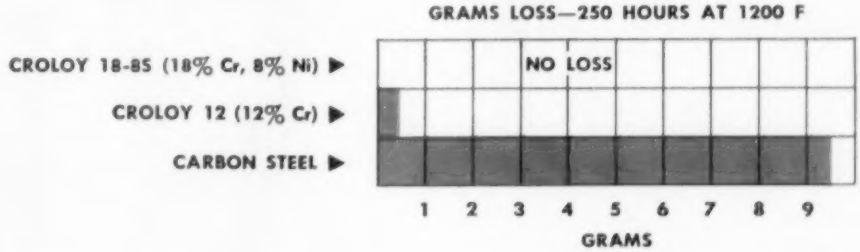
—even a complicated one

When any metal is exposed to high temperatures, it burns. Slow burning is called oxidation and in the process scale forms on the metal being burned. If the process continues the scale will flake off, causing loss of metal.

One of the major benefits resulting from alloying chromium with iron is greatly increased resistance to oxidation at high temperatures. A tight surface layer of chromium-rich oxide is formed and this layer retards oxygen diffusion. Tests have shown that resistance of chromium alloy steel to oxidation is directly proportional to the chromium content of the alloy. The chart below compares relative oxidation resistance at 1200 F of stainless and carbon steels, as determined by scale loss on heating 250 hours.

But only an expert can properly evaluate all of the elements that make up the best analysis to match the requirements of your specific tubing application. There is no substitute for the kind of experience with these problems you'll find at B&W.

To get the most benefit from B&W's long experience in matching tubes to jobs, call on Mr. Tubes, your nearby B&W Tube Representative. He can help you make the best choice.



THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

B&W SEAMLESS and WELDED TUBES

TA-4060(F)

SAVE DAMAGED CASING AND LINERS!

with an Eastman

CASING ROLLER

Body and Rollers of specially heat-treated steel.
Continuous rolling surface minimizes friction and vibration.
Roller ends tapered to prevent snagging.
Circulation through tool and around each roller.

The most efficient, effective and economical way to restore collapsed casing and liners to their original gauge.

Eastman Casing Rollers are available in API sizes for casings with inside diameters ranging from 3½ to 17⅝ inches. Other sizes made to order.

CALL THE EASTMAN OFFICE NEAREST YOU

Consult the Phone Directory

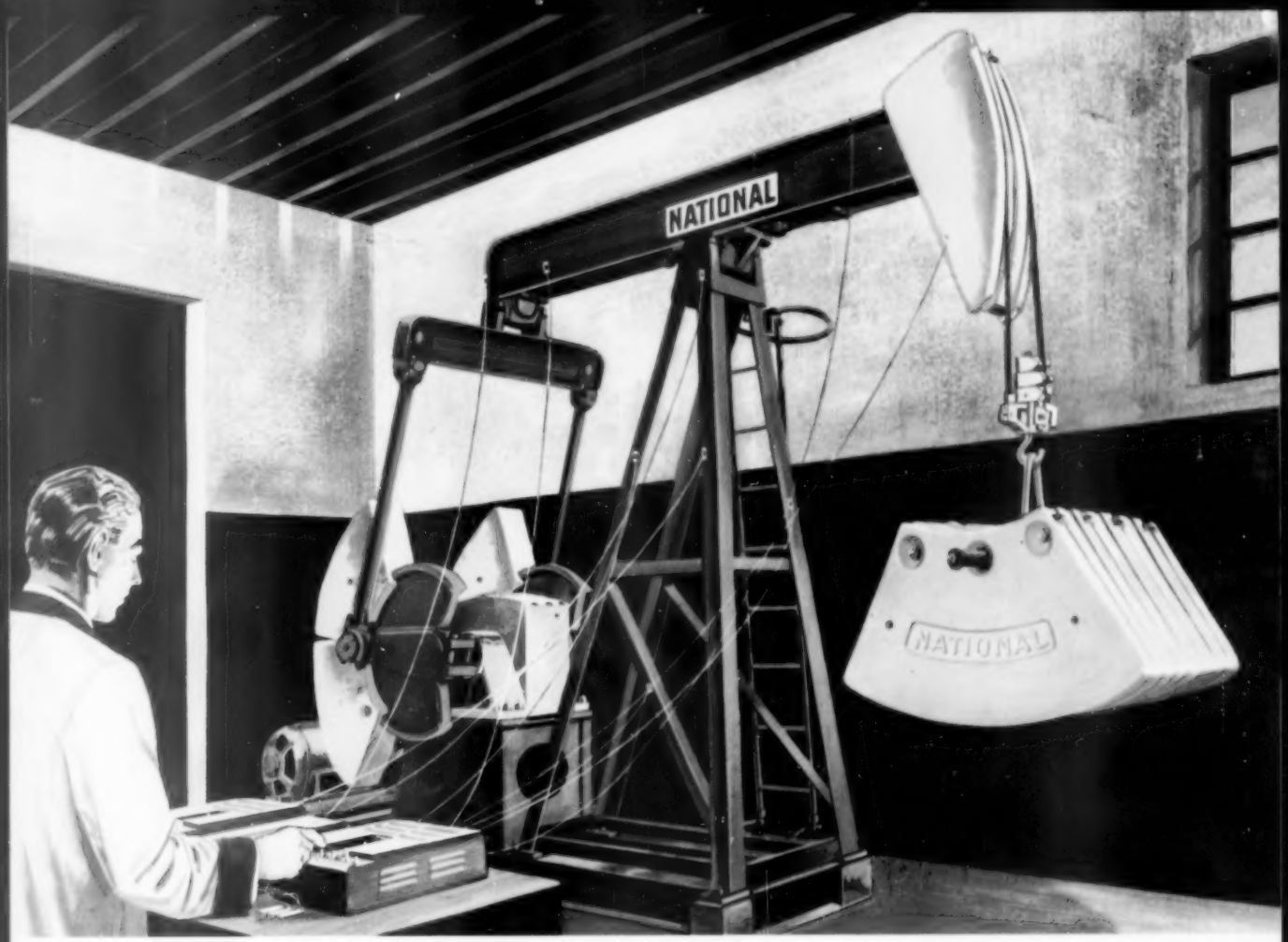
Eastman Oil Well Survey Company

LONG BEACH • DENVER • HOUSTON

Export Sales and Service:

EASTMAN INTERNATIONAL COMPANY

P. O. Box 1500 • Denver, Colorado, U.S.A.



Tests with "heavy well loads" prove its stamina

What happens in the structure of a pumping unit when it has a heavy well load? To get the answer, research engineers at National Supply's Toledo plant conduct special tests like this one.

Unusual pumping and sucker rod loads are simulated with counterweights which exceed the unit's capacity. These are hung on the beam end.

Many postage stamp size strain gages are then bonded to the pumper, to measure stresses at "critical" points. The unit is put into operation and our engineers, by checking the measured impulses from the strain gages, can readily trace the effects of the heavy load—on the walking beam, pitman assembly, beam hanger and samson post.

The results of this tough test repeatedly prove an ample factor of safety in the structure of National Pumping Units—the built-in stamina for which they're famous.

More important, however, is the fact that this plant research, combined with field-use data, leads the way to better pumping units for the industry. It is typical, too, of our constant efforts to make sure you get the best for your equipment dollar—on *all* production and drilling units bearing the National Blue Label.

First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

THE
NATIONAL SUPPLY
COMPANY
PITTSBURGH 30, PENNSYLVANIA

Produce more from "problem wells" at lower cost

with IDEAL® plunger lift

If you're looking for a method and the equipment to turn "problem wells" into profitable producers, add the Ideal Plunger Lift to your list. Simply designed, easy to install and economical to operate, it uses either formation or injected gas to produce:

- Weak flowing wells in tight formations, regardless of depth
- Wells with high bottom-hole pressures and low productivity indices
- Wells with high gas-oil ratios

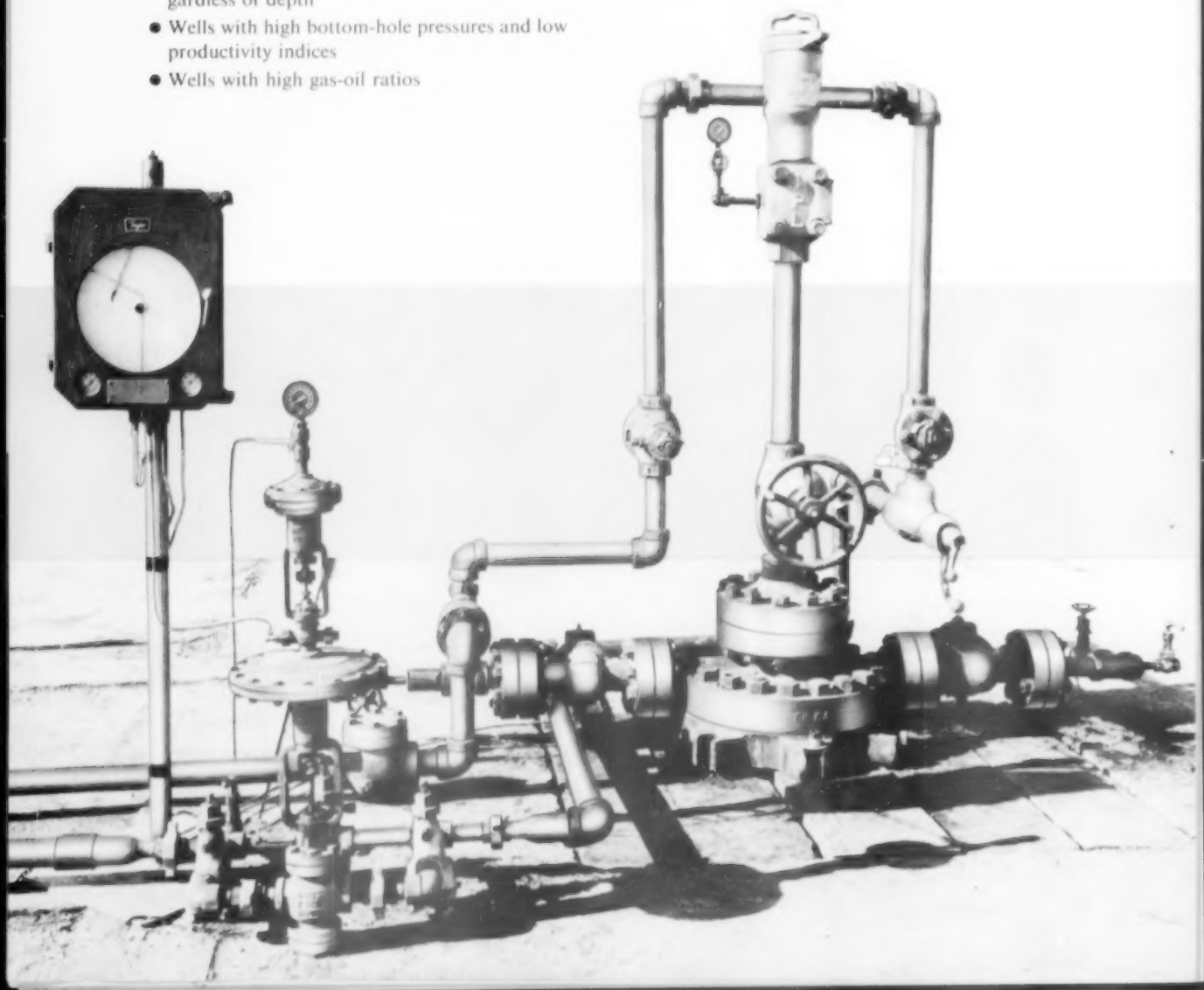
The Ideal Plunger Lift also helps to overcome costly and troublesome well conditions by

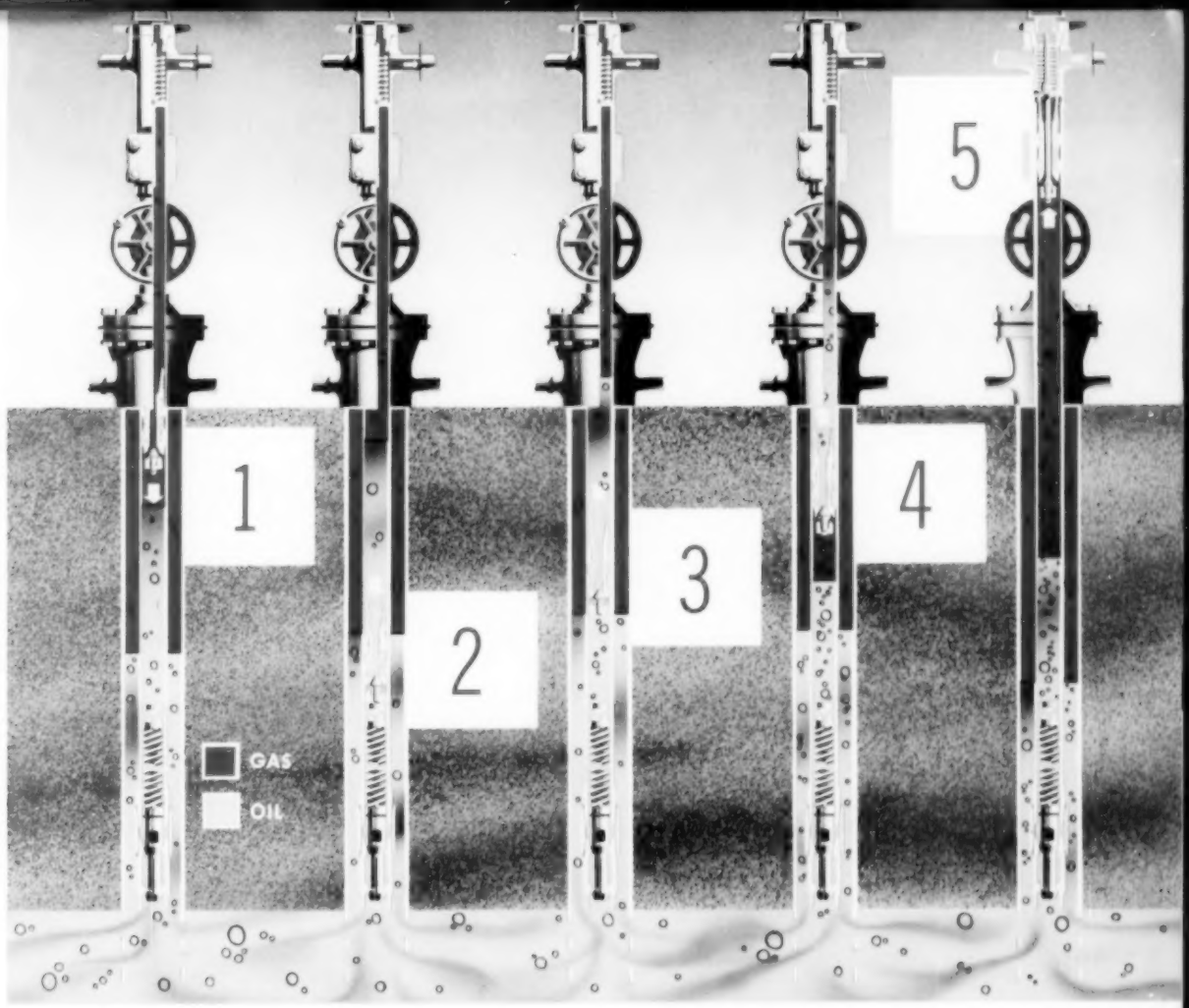
- Preventing and removing paraffin deposits
- Preventing bottom-hole water accumulations
- Reducing emulsion to a minimum
- Reducing scale deposits

With no added gas, the Ideal Plunger Lift operates at lower pressures than required for natural flowing wells. With added gas, too, it maintains low injection pressures, thereby getting the greatest percentage of a well's theoretical production by gas-lift methods.

Along with low initial and service costs of the Ideal Plunger Lift, these economical operating features make it one of the most outstanding production units you can put to work.

You can get more information on the Ideal Plunger Lift at the nearby National Supply Store. A new descriptive bulletin which also contains facts and figures on Plunger Lift installations is yours for the asking. Why not stop in soon?





How the IDEAL® plunger lift works

1 The well is closed and the Plunger, with its valve open, falls by gravity to the well bottom (passing first through the gas in the upper portion of the tubing). Casing pressure is at low point of cycle.

2 With the well still closed, the Plunger strikes the footpiece which closes its valve. The Plunger is now a solid free piston, ready to lift the oil column above it to the surface. Casing pressure increases from low point.

3 When the casing pressure reaches high point, a valve at the surface automatically opens the well. Tubing pressure drops rapidly, and the Plunger starts ascent with load.

4 With the well open and casing pressure decreasing, the tubing pressure decreases to surface flow line pressure. The gas expands, propelling the Plunger with its load to the surface.

5 When gas and oil are displaced to the flow line system, the Plunger valve is automatically opened and the well is simultaneously closed. Casing pressure is at previous low point, and the Plunger again is free-falling, ready for another round-trip.

First in quality... First in supply service in oil country everywhere

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver, Ft. Worth, Houston, Pittsburgh, Tulsa, Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2

for more information on profitable production

See the next page

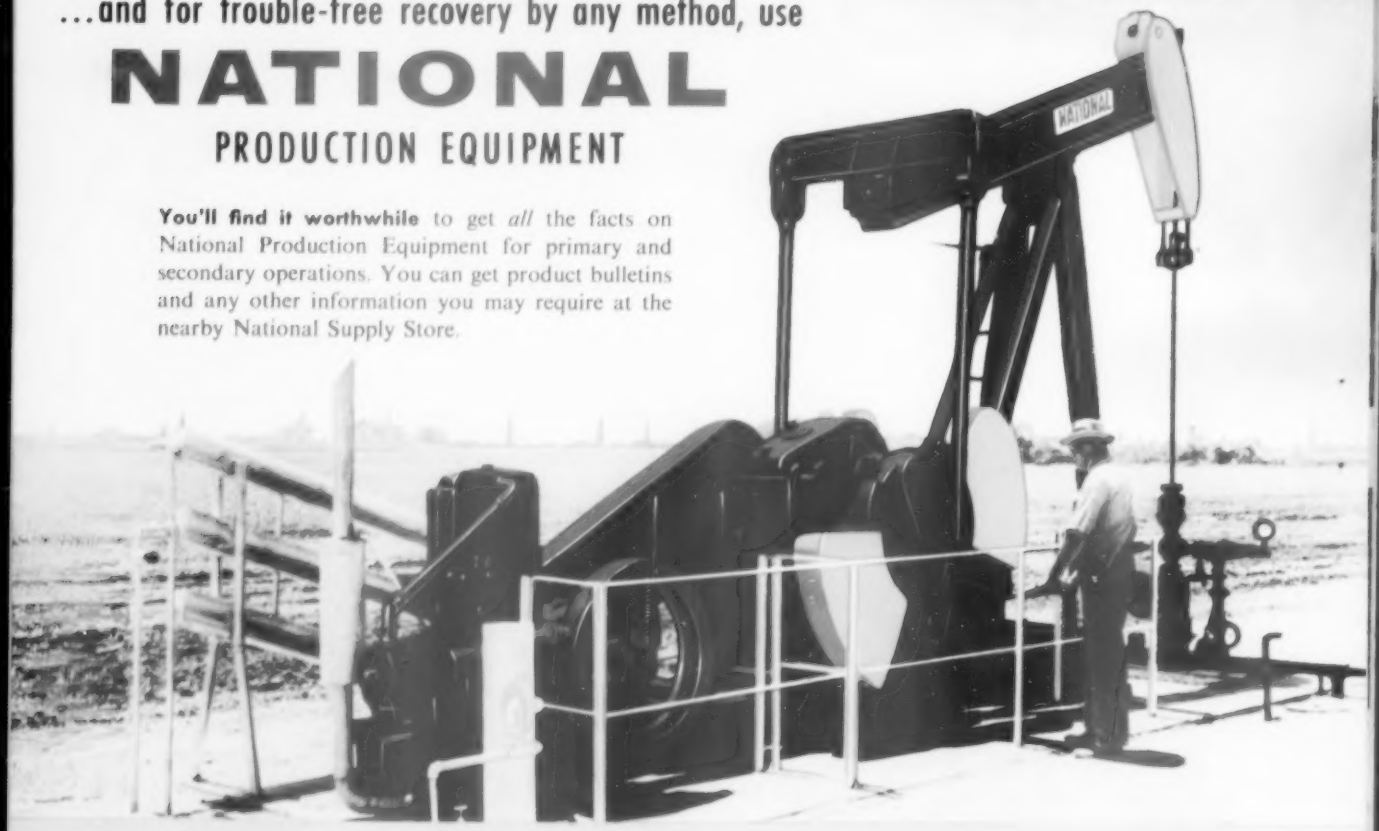
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE
SUPERIOR & ATLAS ENGINES

...and for trouble-free recovery by any method, use

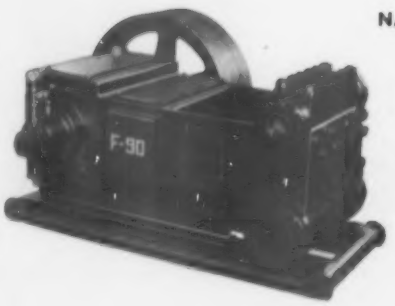
NATIONAL

PRODUCTION EQUIPMENT

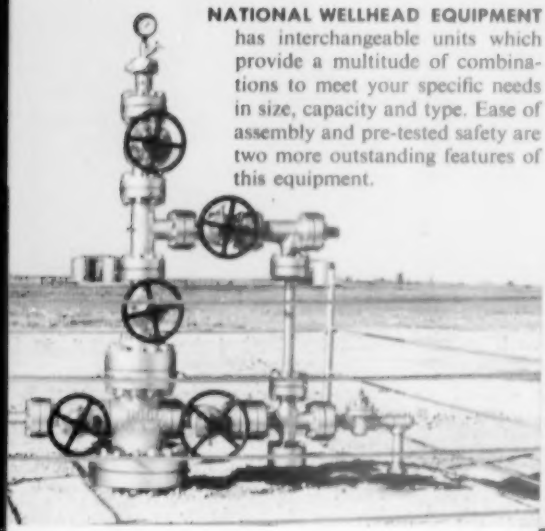
You'll find it worthwhile to get *all* the facts on National Production Equipment for primary and secondary operations. You can get product bulletins and any other information you may require at the nearby National Supply Store.



NATIONAL PUMPING UNITS are ruggedly built in 38 standard combinations, API rated from 3,200 to 32,400 pounds. In this range, there's a model to economically suit every pumping job.



NATIONAL TRIPLEX PUMPS provide maximum volume and injection pressures for today's waterflood projects. Available in several h.p. ratings, they are also usable for salt water disposal, oil gathering, or as power-oil sources for sub-surface hydraulic pumping.



NATIONAL WELLHEAD EQUIPMENT has interchangeable units which provide a multitude of combinations to meet your specific needs in size, capacity and type. Ease of assembly and pre-tested safety are two more outstanding features of this equipment.

NATIONAL SUCKER RODS are precision-manufactured in various grades to meet every load and well condition. They are engineered for maximum resistance to shock, corrosion, fatigue and impulse loads.

First in quality
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2

They Say—

Iran's Return . . .

. . . Keep It Overseas

"Governmental sanction of a major oil company consortium for returning Iran's oil to an already saturated world market is itself full justification for federal action denying foreign oil access to the domestic market except on a supplemental basis.

"Foreign operators must be compelled to limit foreign output to foreign demand if we are to halt the dangerous over expansion abroad which has reduced Texas wells to half-time operation because of wasteful surpluses. We believe that can best be done through an equalization tariff."

Jack Woodward, president of Texas Independent Producers and Royalty Owners Association.

. . . It's Justifiable, If

". . . The structure for future operations outlined in yesterday's announcement is so elaborate that the solid advantages gained by both sides may not be immediately apparent. . .

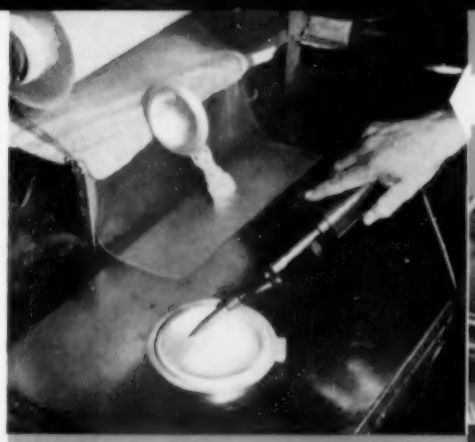
"The Anglo-Iranian Oil Co. . . . has managed to salve much from what once seemed the total wreck of its great Persian enterprise. True, it has had to be content with what amounts to only a token payment of direct compensation from the Persians, but it retains a 40 per cent interest in Persian oil and receives more substantial compensation from its partners in the consortium. . . Oil will. . . be bought and sold largely on a sterling basis.

"The main sufferer . . . seems likely to be the British Treasury, which in one way or another used to extract as much as £50 million a year from the A.I.O.C. No such sum will in future be forthcoming from the company's Persian interest.

"But as this amount . . . was one of the more legitimate grievances of Persian nationalists, the sacrifice is inevitable.

"Like the agreement with Egypt over Suez, the Persian settlement represents an attempt to break an intolerable deadlock. On many grounds it is open to criticism. Some of its implications are still obscure. But, as in the case of Suez, it is difficult to imagine a workable alternative. If the new arrangement works it will be justified."

Editorial in the London Times.



Each Kel-F lined rupture disc is given a leak detector test and must be proven pin-hole free.

The large stock of controlled ductile metals used in the manufacture of BS&B rupture discs enables us to duplicate a previous requirement as well as affording you a wide selection in pressures — from 5 to 50,000 lbs.

For CORROSIVE Conditions

Equip Your SAFETY HEADS With BS&B Kel-F Lined Rupture Discs!

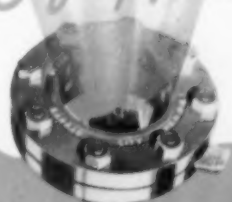
Whenever BS&B Safety Heads are installed in a location where corrosive conditions exist, an unprotected metal rupture disc may be vulnerable to corrosive attack from either the product or the atmospheric side—or both.

The recommended disc to use under these circumstances is the BS&B Kel-F lined rupture disc, which has for more than 3 years proven its resistance to corrosive attack from strong acids, caustics, chlorine, etc. Kel-F is a trade name for a thermo-plastic film of trifluorochlorethylene, which is also known by the trade name of Trithene. Discs may be specified with the Kel-F lining on either or both sides, as your conditions may require.

The use of Kel-F linings in combination with metals of known mechanical and metallurgical qualities such as Inconel, Monel, stainless steel and nickel means positive, trouble-free protection in highly corrosive applications heretofore impossible.

Thus, through "know-how" attained by years of experience in this highly technical field, BS&B has again provided the Process Industries with a *better* safety device for the protection of closed pressure systems!

BS&B Safety Heads



For full information on the BS&B Kel-F lined rupture disc and its application to your specific problem, consult your BS&B Office or Representative . . . or write to us direct.

THE "CIRCUIT-BREAKER" OF *Any Pressured System*

BLACK, SIVALLS & BRYSON, INC.
Safety Head Division, Dept. 2-A8
7500 East 12th St., Kansas City 26, Mo.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

Crown YOUR NEXT OIL FINANCING MOVE with SUCCESS— USE NBT

Many independent operators, oil companies, contractors and suppliers have reached their goal at strategic times through NBT's prompt and friendly consideration of their financial needs.

Broadly experienced in the problems and financial needs for exploration, drilling, production, pipe line and refining operations, the friendly officers of "The Oil Bank of America" have provided helpful counsel and financial aid to many operators in the Mid-Continent and Rocky Mountain Areas. Next time, bring your oil financing problems to National Bank of Tulsa.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

NATIONAL BANK OF TULSA

The Oil Bank of America

. . . Neighbors Should Cutback

"It is hoped that as Iran oil production is resumed that those other oil-producing countries around the Persian Gulf will reduce their output proportionately so as to avoid further flooding of the world markets with oil and causing wasteful storage."

E. O. Thompson, chairman, Texas Railroad Commission.

. . . Gradual Return

"The return of Iranian crude oil and refined products to world markets will be gradual. For that reason, we do not believe that these markets will be substantially affected."

Socony-Vacuum Oil Co.

. . . Ironies of the Settlement

"Some of the ironies of the event are obvious.

"Technically there is a difference from the situation that existed when the refineries were owned by the British company which now heads the group. Title to the business now will be vested in the Iranian Government. But the group will still operate the plants and the royalty payments to the government will be the same as if the British company owned them. . .

". . . The Iranian Government expropriated the properties with the idea that it would just take all the 'vast profits' from their operation rather than share them with foreigners. . . Now the government has accepted a proposition substantially the same as the one it could have had in the beginning. . . This, of course, make the Iranians look a little bit foolish. . ."

Editorial in the Wall Street Journal.

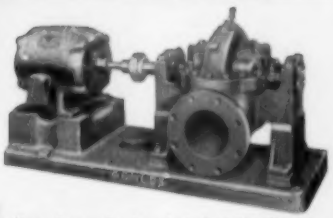
. . . The British Lost Ground

". . . What makes this Iranian oil agreement doubly important is that it comes in wake of the British pact with Egypt, providing for removal of British troops from the Suez Canal Zone, and the French offer of home rule to Tunisia.

"As in Egypt, this oil agreement represents major concessions on the part of the British. The Anglo-Iranian Oil Co. had demanded $500,000,000 compensation for nationalization of the Iranian oil properties and the great Abadan refinery. Now Iran not only keeps those properties as her own, but compensation to Anglo-Iranian Oil will be only about $85,000,000 . . .

"With world oil production elsewhere stepped up to meet the gap left when the Abadan refinery closed down, it remains to be seen whether those oil firms find some tough marketing prob-

Four Goulds 8" Fig. 3460 centrifugal pumps in the compressor station of the Texas Eastern Transmission Corporation at Danville, Ky. Two of them pump cooling water to compressor jackets, the third handles water for cooling lubricating oil, and the fourth is a stand-by, manifolded so that it can be used for either function.



Since Texas Eastern installed the Goulds Fig. 3460 pumps, this Goulds Fig. 3405 has been developed as a further improvement in pump design and economy. Bulletin 721.6 describes it in detail.

Keeping Gas Compressors Cool Is a Big Pumping Job

Pushing upward of 250 million cubic feet of natural gas daily from the Gulf South to the industrial Northeast is a big job, and the giant pipeline compressors that do it generate a lot of heat.

They're kept cool by circulating thousands of gallons of water through their jackets every minute.

The compressor station of Texas Eastern Transmission Corporation at Danville, Ky., has a typical installation. Four Goulds 8" Fig. 3460 centrifugal pumps circulate the cooling water.

Since they were placed in operation 2 years ago these pumps have required only normal maintenance care. Similar installations of Goulds pumps are in operation in other Texas Eastern stations.

This is just one example of the many applications of Goulds pumps. The full Goulds line includes models and sizes for practically every industrial pumping requirement. And Goulds engineers have a background of 106 years of pump manufacturing and liquid-handling "know-how." We'll be glad to consult with you on any pumping problem. Just drop us a line.

MEMBER

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Seneca Falls
New York

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Where Mission makes the difference

Notice the small groove in the Mission Piston body flange? Here's where Mission makes another major difference! This groove, which is carefully and accurately machined to tolerances of 1/10,000 of an inch, functions as a built-in wear gage.* When after long use the flange of the piston body is worn to the bottom of the wear groove in any spot around the circumference, it is time to replace the piston body. Until the wear groove indicates optimum use has been obtained, you simply replace the long-life rubbers and save the piston body, thus reducing piston replacement costs substantially. This "little extra" in the Mission Piston design was originated by Mission to help you get longer and better service life.

Specify Mission Pistons to your supply store. No other piston gives you the extra Mission quality that results in longer, trouble-free service before requiring attention—and costs less to renew when finally worn.

*Patent Pending

Nothing but the finest will ever bear the name of

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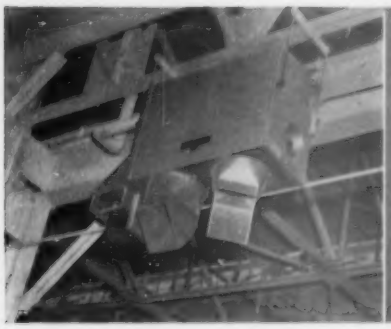

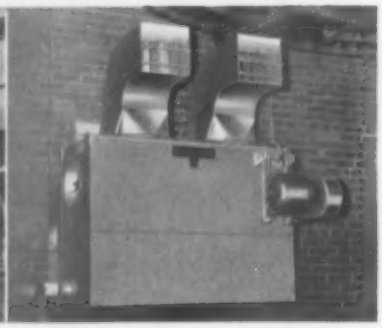

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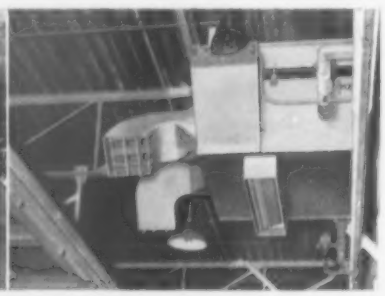
with a "Buffalo" Suspended Lowboy Unit Heater. Easily mounted in roof trusses. Spreads abundant, low-cost heat where you need it. Provides ventilation in warm weather.

FRESH, CLEAN WARM AIR

(or cool outside air) is delivered by a compact "Buffalo" Highboy Unit with fresh air filtered intake thru side wall. Bearing bowl at left permits easy external lubrication.



LOW OVERHEAD — HIGH EFFICIENCY!

Wall-mounted Lowboys provide plenty of heat even where quarters are cramped. New coil design increases heating surface, with narrower coil section. Coils are non-freeze.

SWIVEL OUTLETS "AIM" FLOW

accurately—a "Buffalo" efficiency feature. Others are "Buffalo" mixed-flow fans with unusually stable performance — standardized parts — lifetime construction.

Let us show you NOW how low-cost and easy it is

to heat and ventilate your plant. Bulletin 3704-A gives all details on the units to handle your heating — ventilating — makeup air problem. Handy chart gives you air diffusion distances for each unit and capacity up to 35,000 cfm.

WRITE FOR BULLETIN 3704-A TODAY!

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lems. But the important fact is that one more political sore spot has been removed . . ."

Editorial in the Philadelphia Inquirer.

. . . The Lesson from Iran

"Costly as the dispute over Iranian oil has been to all concerned, the affair may yet be proved worthwhile if lessons are learned from it. Under-developed countries with rich resources now have an object lesson in the heavy cost that must be paid by one of their number who goes berserk with fanatical nationalism.

"It is perhaps too much to hope that Iran's experience will prevent the rise of Mossadeghs in other countries, but that experience may at least strengthen the hands of more reasonable and more far-seeing leaders . . ."

Editorial in the New York Times.

The Tanker Monopoly

"If Saudi Arabia and Mr. Onassis succeed in putting the agreement into force, it will gradually lead to a monopoly for Onassis' ships as regards the transport of Saudi Arabian oil.

"One cannot expect the authorities and businessmen of other countries to watch such a development actively, a development which will lead to a less effective utilization of the tanker tonnage of the world."

Norwegian Minister of Shipping Nils Handal in a statement referring to the Saudi Arabia-Onassis tanker contract.

What TIME Didn't Print

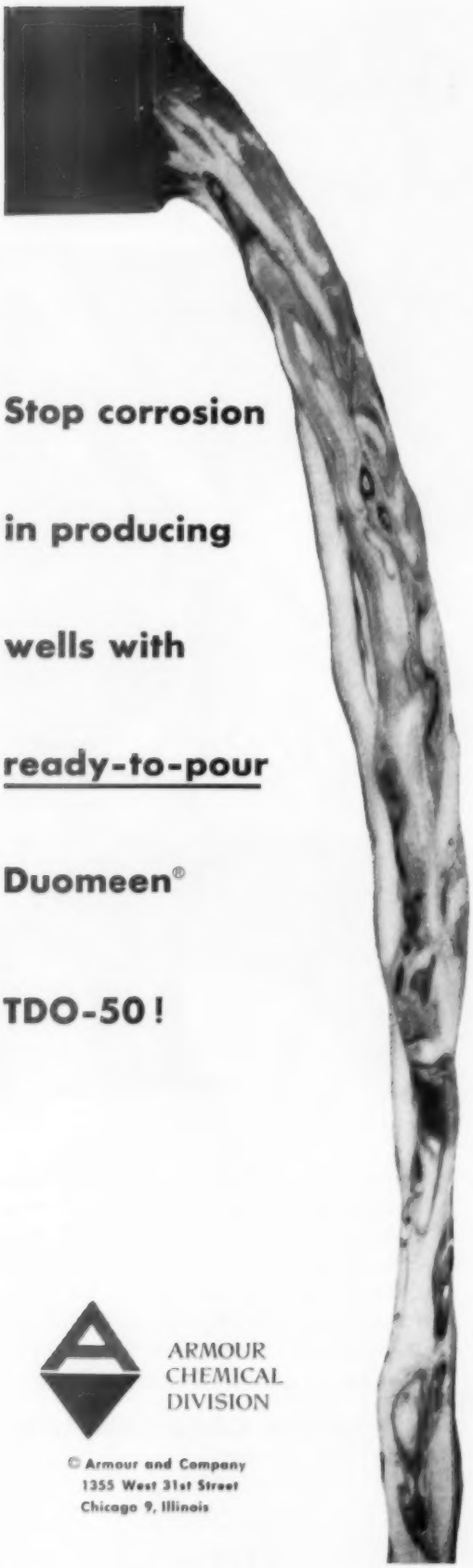
Dear Sir:

In view of the fact that The Oil and Gas Journal showed considerable interest in the article which appeared in Time on May 24 concerning Mr. Murchison, I thought you might care to look over the enclosed copy of a letter which I wrote for publication in Time, but which was returned to me by the Editor . . . with the statement that they did not have sufficient space for it . . .

Frederic H. Lahee
Geological and Research Counselor
Sun Oil Co.
Dallas, Tex.

Sir:

Your implied conclusion with reference to the 27½ per cent depletion allowance, as stated on page 91 of your issue of Time for May 24, 1954, are so absurd that they need correction by



Stop corrosion in producing wells with ready-to-pour Duomeen® TDO-50!

ARMOUR CHEMICAL DIVISION

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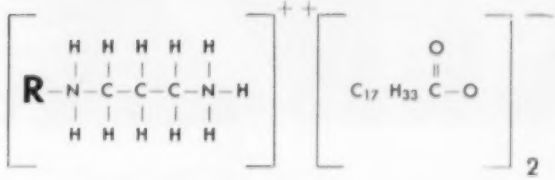
Chicago 9, Illinois

No mixing! Just pour this low-cost Armour chemical down the hole—protects sucker rods, pumps, tubing!

Duomeen TDO-50 is our potent new corrosion inhibitor supplied as a 50% active solution. This cationic surface active agent is already mixed with a petroleum diluent to save you the trouble of blending in the field. It's ready to pour at even −10°F., ready to convert steel surfaces from water-wettable to oil wettable, thus forming a protective coating against corrosion.

Regular Duomeen TDO, our *100%* active corrosion inhibitor, has found wide use because of its outstanding results in controlling acid conditions in sour wells using quantities as low as 1-4 pints per 100 barrels of produced oil! But, since some of our customers wanted a ready-to-use form of this effective chemical, we developed ready-to-pour Duomeen TDO-50. Now, both products are available in truckload and drum quantities, to help you stop corrosion all the way down to the bottom of the hole. Send the coupon for our free technical bulletin on corrosion, and free samples of Duomeen TDO and TDO-50 to test yourself!

Structural Formula for Duomeen TDO:



Mail This Coupon to Stop Corrosion Costs Now!

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Please send me:

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- ☐ Sample of Duomeen TDO-50
- ☐ "Combat Corrosion" Booklet

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Title .....
Firm .....
Address .....
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O 8

WHO DO YOU THINK HE'S WORKING FOR?

This man has no regular working hours.

He may drive 10, 25, 50 or a hundred miles to work every day through all kinds of weather.

In the course of his day, he may work for as many as five different companies.

He may be called upon to help shape a vital decision about a million dollar investment.

This man is a Magcobar Mud Engineer and he is glad to accept your drilling mud problems as his problems and help you find the fastest, most economical solution. Yes, this man is trained and employed by Magcobar, but he is employed for you . . . the drilling contractor and oil operator who needs prompt, accurate laboratory analysis of his mud at the well. Call on him often. He's a good man to have on your drilling crew.

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ONE OF THE DRESSER INDUSTRIES

Magcobar

some actual facts, some actual statistics . . .

The fact that a very few men have had great success in their drilling for oil does not by any means imply that all those who drill for oil are going to be successful. In the last 10 years, the industry has drilled 46,586 exploratory wells in territory where oil has not been found previously . . . Of these . . . 41,389 were dry. The remaining 5,197 discovered oil or gas or oil plus gas. Many of them yielded so little that they had to be abandoned. Many of the oil wells opened fields so small that their total reserves are estimated at less than 1 million barrels. One million barrels of oil may sound to the uninitiated like a huge volume of oil, but actually, on the average, a field with any less oil does not pay the costs of its development.

Where careful figures are available for fields discovered at least 6 years ago—i.e., with 6 years of development history on which to base estimates of their reserves—statistics show that only 2.4 per cent of the total exploratory wells drilling in territory where oil had not previously been found discovered oil fields that are paying out.

In other words: only one out of every 41.6 such wells discovered an oil field that paid out. More than 94 per cent of the total number drilled are economic failures, with 3.6 per cent being dry gas wells.

This is why the 27½ per cent depletion allowance is necessary. It offers a fair and reasonable opportunity for those who drilled the many thousands of failures to try again . . .

Frederic H. Lahee

CALENDAR

AUGUST

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

27-28 Joint meeting, reserves committees of A.G.A., A.P.I., Canadian Petroleum Association, Banff, Canada.

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

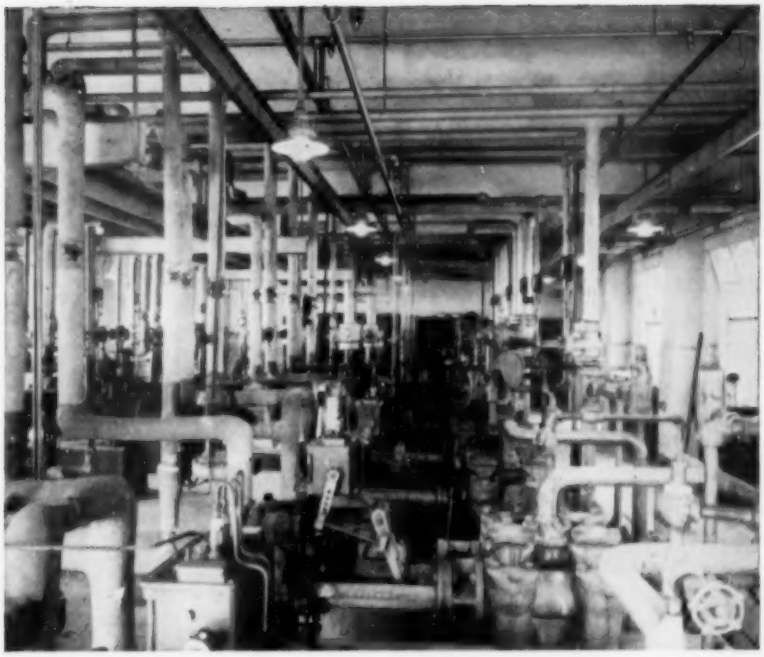
8-10 Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.

9-11 Billings Geological Society, annual field conference, Billings, Mont.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical En-



ENGINEERED PROTECTION

To Lick Fire—Maintain Profits!

Close inspection reveals much more than meets the eye in this petroleum refinery pump room. "Automatic" FIRE-FOG protection, ENGINEERED to this specific risk, is ready at all times to detect and extinguish fire, should it threaten to destroy property, halt production, reduce profits.

This is but one type of a wide variety of fire-fighting systems designed, manufactured and installed by "Automatic" Sprinkler Corp. of America. Others employing AIR FOAM, high or low pressure CO_2, Dry Powder, etc. stand guard over scores of petroleum and petro-chemical properties throughout the world.

The time to plan ENGINEERED "Automatic" FIRE PROTECTION is **before** fire strikes—not **after** fire has destroyed. Contact your nearest "Automatic" Sprinkler fire protection engineer for an appointment with a Safety First future. He'll gladly prepare a fire protection analysis for you without cost or obligation.

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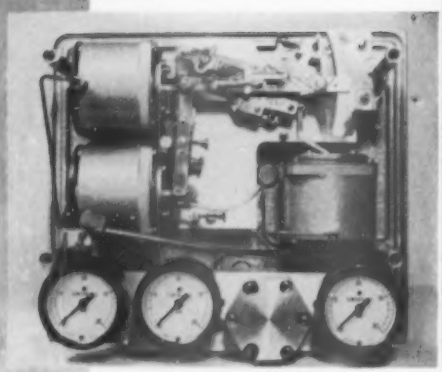


Interior view of Ratio Relay shows simple, compact construction. Pressure gages indicate input signals and output pressure. Adjustments for control action, zero setting and ratio range are readily accessible.

The Tel-O-Set Ratio Relay offers these unique features:

★ **LINEAR RATIO**

Output changes in straight-line relation with primary variable. Permits better control tuning . . . eliminates "compromise" settings.

★ **DIRECT OR REVERSE ACTION**

Readily set to provide either increasing or decreasing output . . . increasing or decreasing ratio.

★ **FLEXIBLE ADJUSTMENT**

Ratio range can be reduced to any desired value. Reduced span can be positioned at any desired portion of the maximum range. Factory setting is 50—150% ratio range.

★ **WIDE RANGE**

Ratio can vary from 0 to 200% for a full scale change in the primary variable.

★ **ADJUSTABLE LIMITS**

Readily set stops are provided to limit minimum and maximum output pressure.

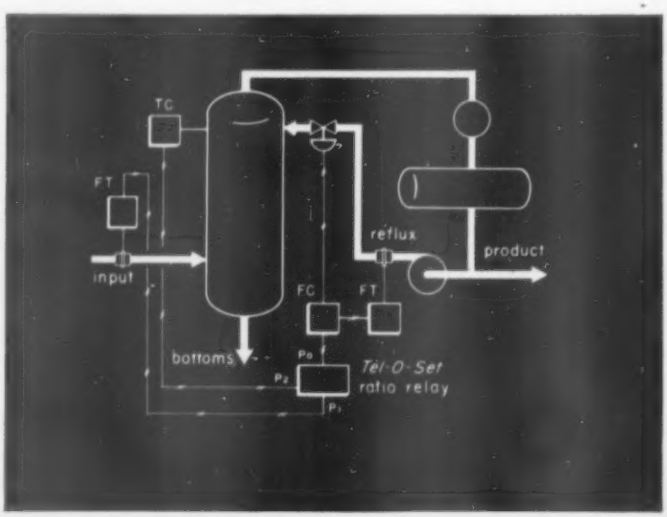
★ **ZERO SUPPRESSION**

Independent zero adjustments permit selection of the exact input-output relationship desired.

★ **INDICATING GAGES**

Separate indicators show output pressure and both input pressures.

On a distillation column, Tel-O-Set Ratio Relay receives air signal (P_2) from column temperature controller. This signal varies the ratio of the output pressure (P_0) to the signal received (P_1) from the input flow transmitter. Output pressure feeds into an *Indexet* remote setting index in the flow controller, to reset this instrument and thus throttle the valve in the reflux line. Ratio of reflux to input is thus varied in accordance with temperature of the top of the column.



New, versatile means for effecting cascade control

the Tel-O-Set Ratio Relay

HAVE a complex control loop? Here's a versatile way to simplify it . . . the new *Tel-O-Set* Ratio Relay. Another advanced idea in process control from Honeywell, this unique relay proves the ideal solution to complex cascade control problems.

The Ratio Relay provides automatic control with a single element influenced by three interrelated variables. For example, it is used on distillation columns (see diagram) to control the ratio of reflux to feed, as column temperature varies. In absorption towers, it regulates ratio of absorbent and feed stock to give constant concentration of product. And there are scores of other uses for this relay . . . in evaporators, controlled-atmosphere furnaces, reaction tanks, engine testing and other applications where several related variables must be interlocked for efficient operation.

The Ratio Relay receives pneumatic signals from remote transmitters, controllers or manual loading stations. It produces an output air signal for readjusting the set point of a secondary controller. It is the ideal companion for Honeywell Differential Converters, *Tel-O-Set* miniature instruments and Brown pneumatic controllers.

Your nearby Honeywell sales engineer will be glad to discuss applications to your specific process . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● REFERENCE DATA: Write for Bulletin 8410, "*Tel-O-Set* Ratio Relay."

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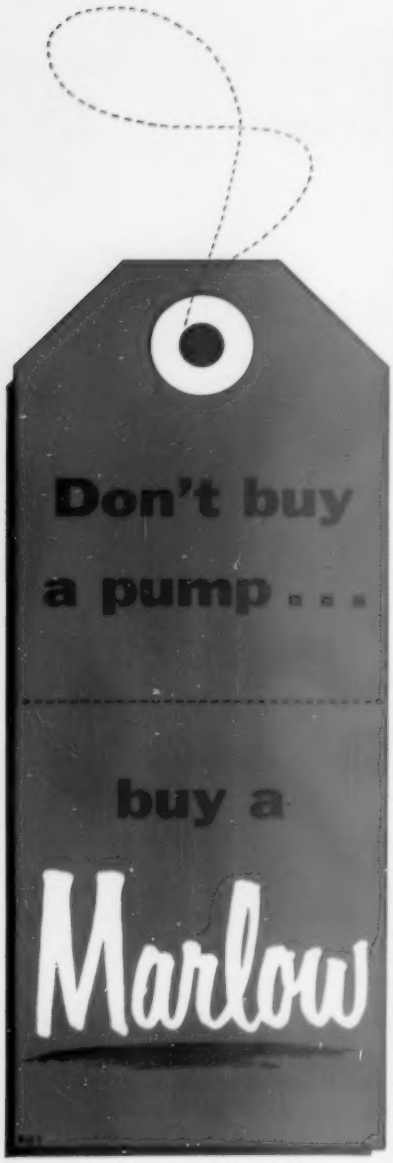

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Division of BELL & GOSSETT COMPANY

gineers, Colorado Hotel, Glenwood Springs, Colo.

12-17 American Chemical Society, 126th national meeting, New York.

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.

13-25 Instrument Society of America—First International Instrument Congress and Exposition, Museum and Convention Hall, Philadelphia.

14-15 National Association of Corrosion Engineers, South Central region, Dallas.

15-16 American Gas Association, sixth annual accident-prevention conference, Bond Hotel, Hartford, Conn.

15-17 American Petroleum Institute, lubrication committee, Traymore Hotel, Atlantic City, N. J.

15-17 **National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.**

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

17 Natural Gasoline Association of America, Oklahoma regional meeting, Skirvin Hotel, Oklahoma City.

17-18 Kansas Geological Society, 1954 field conference, Rolla, Mo.; repeat trip September 24-25.

23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

25-27 Diesel and Gas Engine Power Plant Operators Conference, sixth annual conference, Oklahoma A. & M. College, Stillwater, Okla.

27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.

27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.

28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.

30 Southern Gas Association, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.

1-2 Standards Engineers Society, annual meeting, Haddon Hall, Atlantic City, N. J.

3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.

4-6 **Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.**

4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.

5-7 American Institute of Electrical Engineers, Middle Eastern district, Abraham Lincoln Hotel, Reading, Pa.

6-8 Eighteenth Technical Conference on Petroleum Production. Pennsylvania State University, State College, Pa.

7-8 **California Natural Gasoline Association, twenty-ninth annual fall meeting Ambassador Hotel, Los Angeles.**

7-8 American Institute of Mining and Metallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.

10-13 American Association of Oilwell Drilling Contractors, fourteenth annual meeting, Biltmore Hotel, Los Angeles.

10-16 Oil Progress Week.

11-13 **American Gas Association, annual convention, Atlantic City, N. J.**

11-17 Permian Basin Oil Show, Odessa, Texas

12-15 American Chemical Society, national meeting, Chicago Coliseum, Chicago.

12-15 **Eighth National Chemical Exposition, Chicago Coliseum, Chicago.**

14-17 Permian Basin Oil Show, Odessa, Tex.

17-20 **American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.**

18-19 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.

21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

21-23 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

24-26 **Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.**

25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.

26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

NOVEMBER

1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.

4-5 **Society of Automotive Engineers, national fuels and lubricants meeting Mayo Hotel, Tulsa.**

5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.

8-11 **American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.**

11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.

17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.

18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.

18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.

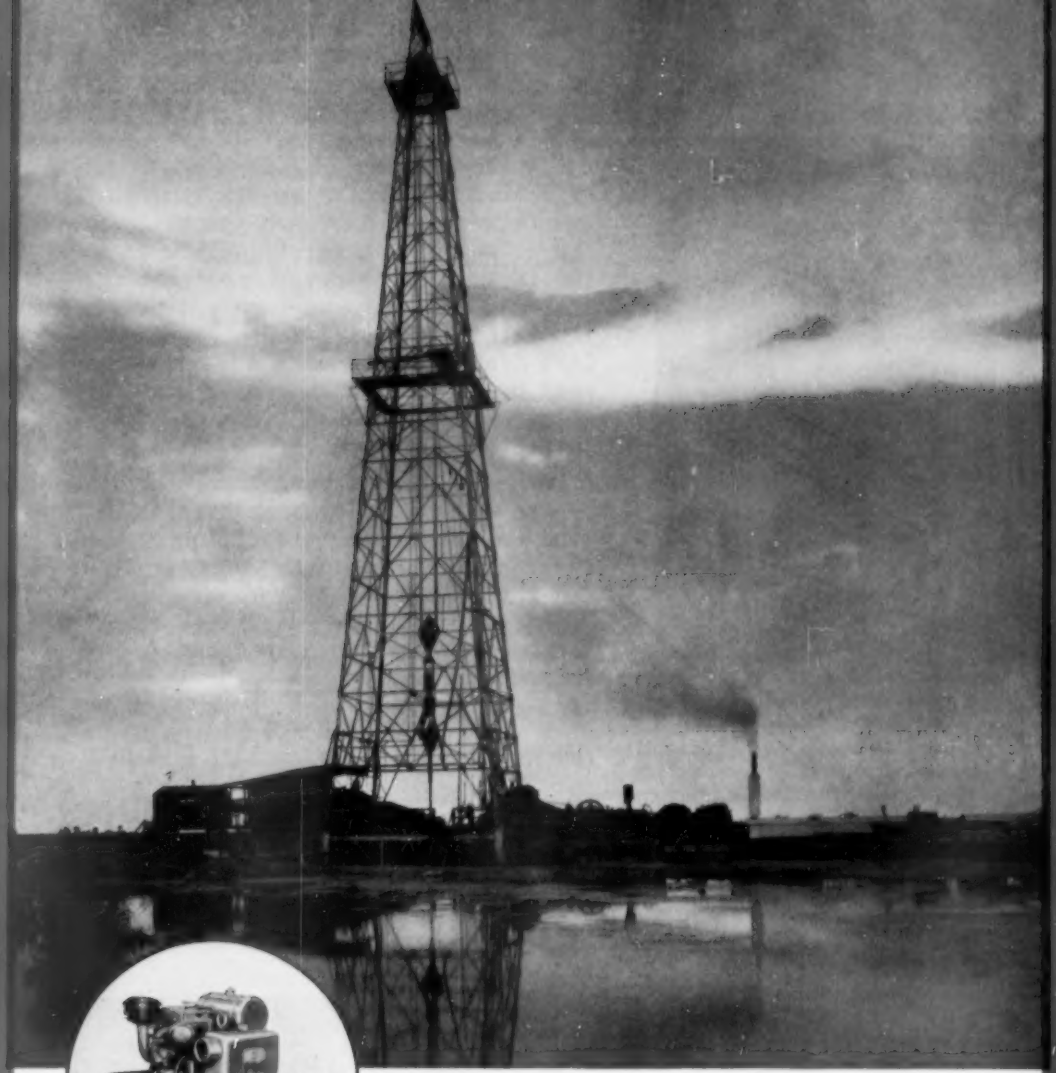
28-Dec. 3 **American Society of Mechanical Engineers, Statler Hotel, New York**

DECEMBER

2-4 Interstate Oil Compact Commission winter meeting, Drake Hotel, Chicago

2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.

3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.



Dawn to dusk or 'round the clock duty doesn't bother tool pushers who need dependable pumping. They're finding Marlow Self-Primers and Marlow "Mud Hog" Diaphragm Pumps are an important part of their job. For pumping wastes from cellars, or for washing down rigs, brake cooling service, and utility water supply, Marlows can't be beat!

marlows are durable!

Marlows are "old hands" at oil country pumping. They're built to handle the tough jobs in the field efficiently, day in and day out, with little attention and low maintenance. Known for their rugged dependability by majors and independents alike, more and more veteran oil men are making Marlows their *first choice!* Make sure with Marlow . . . get *all* the facts from your Marlow Dealer or write for Bulletin O-53.

MARLOW PUMPS • RIDGEWOOD, NEW JERSEY

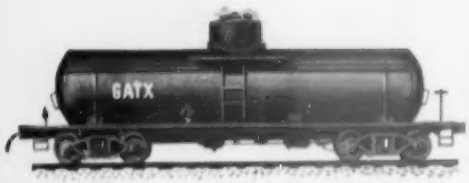
Division of BELL & GOSSETT COMPANY

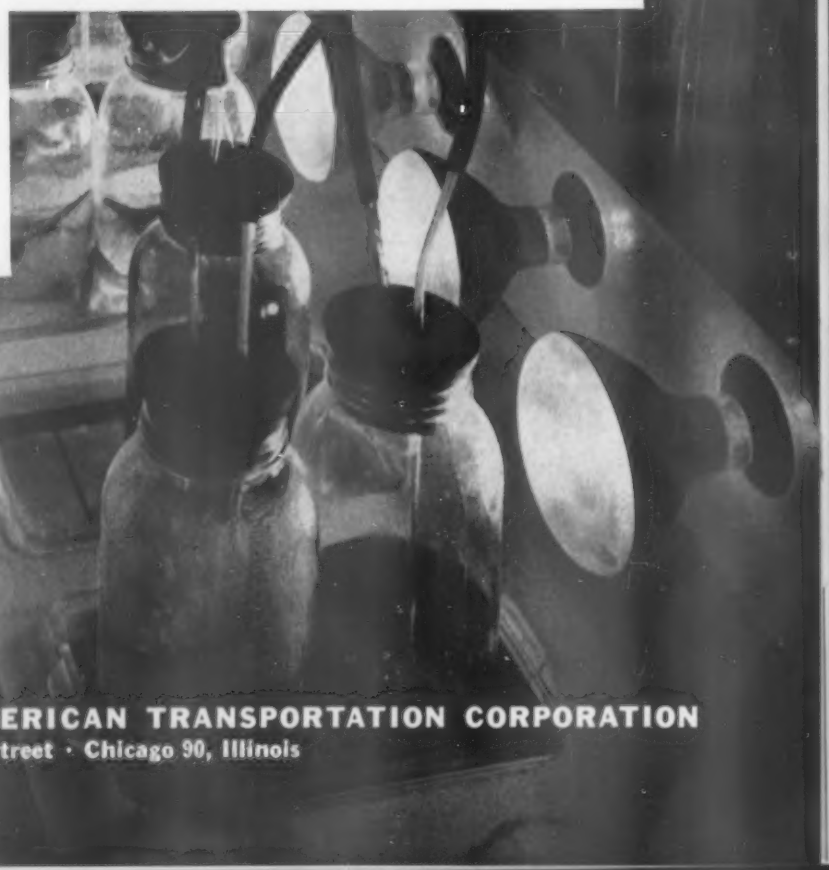
Testing tank car linings is a scientific job at General American. Our Research and Development Laboratory runs "commodity tests" on every liquid carried in GATX tank cars. These two-way tests examine the effect of the lading on the linings and fittings of the cars—as well as the effect of the car interiors on the ladings. They determine the best linings, parts and replacement parts for more than 200 different types of GATX tank cars. Results are also used by our mechanical department in setting standards and times of inspection for each car.

A large, fully-equipped laboratory supports General American's maintenance, design and production departments in building and operating the 47,000 car GATX fleet. The "lab" is one of the facilities that aids General American in giving shippers more dependable service for transporting liquids in bulk.

Car repair shops throughout the U. S. A.
Offices in principal cities

inside information on GATX tank cars





GATX GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South La Salle Street · Chicago 90, Illinois

THE OIL AND GAS
JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

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JOURNALLY Speaking

How to Win Friends

SOME weeks ago this column carried a piece relating how a group from Socony-Vacuum's soon-to-be-shut-down Olean, N. Y., refinery visited Ferndale and Bellingham, Wash., to investigate these cities as possible new homes. Efforts of the established Washington citizens will result in quite a few Olean families making the westward trek.

These residents of Whatcom and Sagit counties until a year ago had little knowledge of the petroleum industry. The service station had been their sole contact until General Petroleum, Socony's western affiliate, decided to erect a 35,000-bbl. refinery at Ferndale. The fact that they really rolled out the red carpet for the five visiting easterners and their wives speaks well of the policies Gee Pee has used in dealing with its new neighbors.

Steps toward making these people friends of the oil industry started as soon as public announcement of the proposed plant was made in November 1952. A year ago, when construction was about to begin, Whatcom's entire population of 66,000 people was invited to visit the plant site. Some 22,000 attended the dedication ceremonies and consumed 15,000 hot dogs, 15,000 cups of ice cream, 8,000 sandwiches, 20,000 cups of coffee, and 15,000 bottles of pop.

Since then the effort to become friends wih its new neighbors has been carried on daily by Bechtel's and General Petroleum's construction people. When Curtis Cortelyou, new refinery manager, takes over the completed plant later this year, not only will his fellow citizens know a little about how an oil refinery operates, but the ground work will be laid toward the 300 permanent refinery employes having "good neighbors."

"Place of promise" . . . Shell Oil Co., another of the West Coast companies which places much emphasis on good public relations, is going one step further in assuring there will be the proper climate of acceptance at nearby Anacortes, and the surrounding areas, where it is building a 50,000-bbl. refinery.

Instead of trying to explain how a refinery operates, and what it does, Shell has produced a picture. Entitled "Place of Promise," the film tells in broad terms what a refinery is, and tests the various skills and people required for its efficient operation.

The younger set . . . Standard Oil Co. of California apparently believes it is never too early to start making friends for the industry, or for them to start learning about how oil is produced and refined. In more than 2,500 classrooms of western schools, elementary and junior-high students are learning about the functions of a refinery through Standard's model oil-refinery kit.

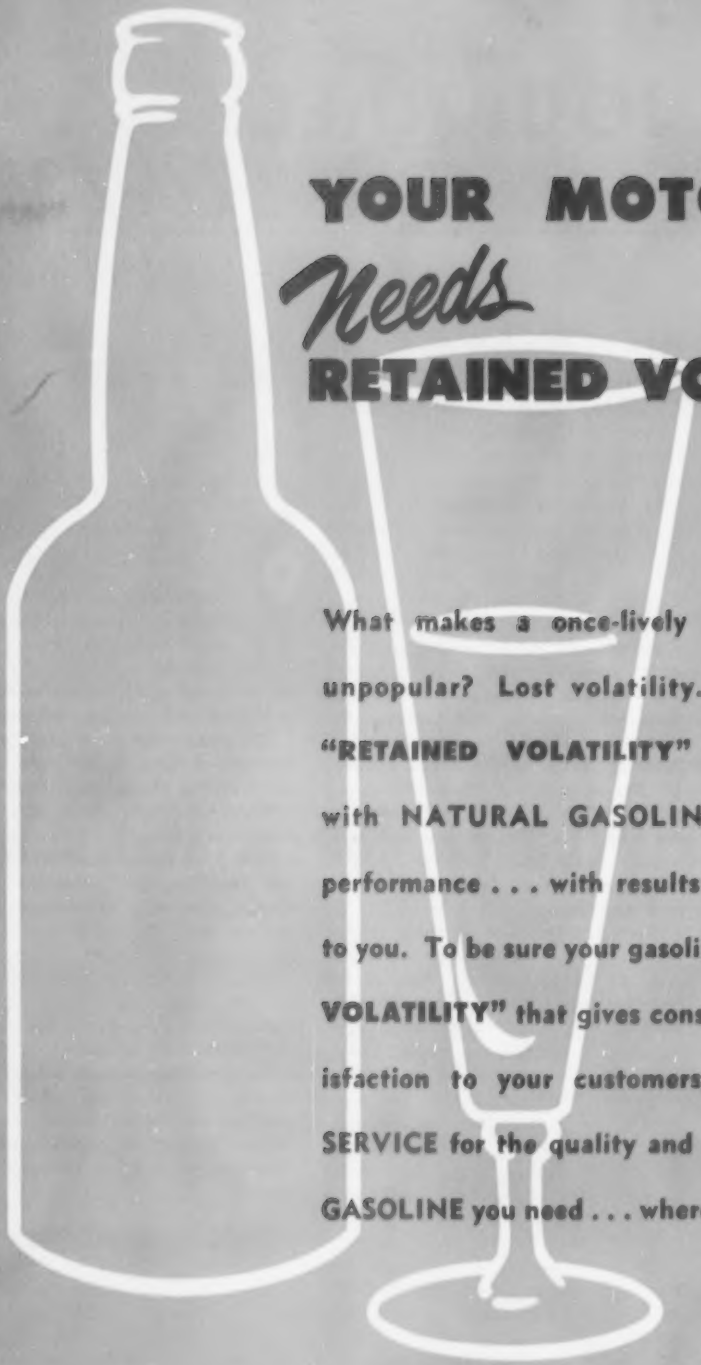
The kit contains several score parts for building the miniature towers, tanks, pipelines, truck-loading rack, tankcar spur, and other appurtenances of a modern refinery. Included are building instructions and a handbook for the instructor. Thus in case the instructor is not an authority on building models, or does not know just what does take place in an oil refinery, it's all there. Also in the package are materials and equipment for performing six experiments which illustrate some of a refinery's functions.

California Brags

Not only do California oil fields hold the deepest hole and deepest producing well, just a few miles apart in San Joaquin Valley, but the world's "most horizontal" vertical well is also believed to be there. At a little publicized offshore well drilled several years ago from an upland location in Long Beach, a drift angle of 83° was reached at one point.

Total drilled depth of the well, now being produced by Monterey Oil Co., is 12,180 ft. Vertical depth is approximately 5,700 ft. Or in drilling to that depth, the well was slanted seaward 9,271 ft. from the derrick floor.

—*D. H. Stormont.*



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Sell more oil by selling more roads

ONE big reason for the oil industry's troubles this summer is that people are using a lot less gasoline than the industry could supply, despite the hundreds of thousands of new automobiles sold.

A partial explanation of this is that streets and highways are so congested that people would rather stay home than drive their cars.

This is a mighty good reason for everybody in the oil business—from geologist to marketer—to take a personal hand in programs for highway improvement. In addition, the oil industry itself is one of the biggest users of highways, and the taxes it pays and collects from its customers are by far the biggest source of highway funds.

A 19-POINT HIGHWAY POLICY has been drafted by the American Petroleum Institute, laying down sound principles for state and federal programs for planning, building, and financing adequate streets and roads. It combines planning for the long range with immediate elimination of local trouble spots.

This is enlightened self-interest. In promoting this program the oil industry is not only helping itself but helping the entire nation. The scientific approach, aggressive action, and management talent for which the oil industry is famous should solve the traffic problem if anything can.

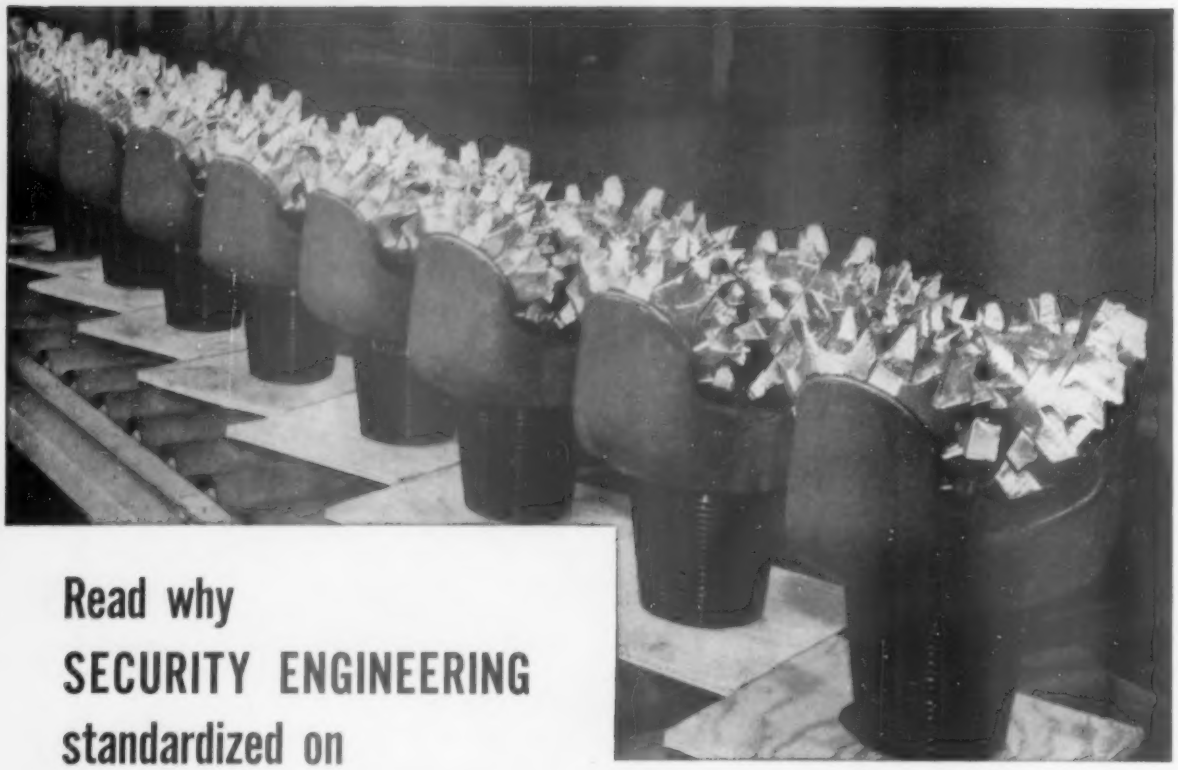
The American Petroleum Industries Committee is now engaged in promoting the A.P.I. program and working with highway officials to get parts of it put into practice wherever possible. This is a slow, hard job. More steam is needed.

LIKE ALMOST EVERY ASPECT of American public affairs, the highway problem is essentially a local problem. People insist on considering expressways and parking spaces, bridges and boulevards, as local facilities, whether or not they are related to interregional travel. Highway administration likewise is primarily at the community level.

So the place to initiate real highway improvement is at the grass roots, the local communities. Local citizens should discuss the A.P.I. plan with their city council, county commissioners, and state legislators.

Highways are everybody's business, but "what's everybody's business is nobody's business." Oil men can make it their business to do something about it by putting local steam behind a well-conceived national plan—the oil industry's highway plan.

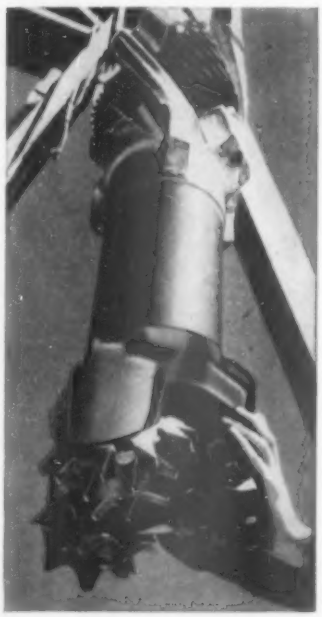
No one has a greater stake in good roads than oil men; they use them, they pay for them, they get much of their business from them. They can wield great power in solving the traffic problem if they use their influence with local authorities.



Read why SECURITY ENGINEERING standardized on

NICKEL STEELS for Cutters

Economy in Drilling depends a great deal on the combined strength, hardness and toughness of cutters in rock bits and roller-reamers, such as shown here. To obtain essential combinations of properties, a leading manufacturer ... Security Engineering Division, one of the Dresser Industries, Whittier, California ... standardizes on nickel alloy steels for these components.



You know that rig operating costs leave no room for second chances. Drilling calls for cutters that are right the very first time they're run into a hole ...

Accordingly, to assure the ultimate in stamina for both case and core of these vital parts, Security Engineering Division, one of the Dresser Industries, standardizes on cutters made from nickel steels.

By far the best performer reported by Security Engineering is a carburized nickel-molybdenum steel which provides unusual surface hardness ... for wear resistance ... backed by a tough core that withstands heavy shocks and overloads. From this carburized steel of the 4812 type, Security produces rock bit cutters in a variety of tooth patterns.

Type 4620 is another case-hardening nickel-molybdenum steel utilized by the manufacturer of these tools. This grade, also notable for its dependable mechanical properties, is specified in cutters for hole reamers, and casing scraper mandrels.

Either alone or together with other alloying elements, nickel makes possible a combination of properties to answer virtually any specific demand. An alloy containing nickel may help you get maximum equipment life per dollar invested.

Let us help you solve your metal problems... write us today...send the details for our suggestions.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

THIS WEEK . . . . . IN THE NEWS

PRODUCTION—The downward trend in Texas production is arrested as Railroad Commission hikes allowable to 2,792,276 bbl. for September. . . . Figure is 71,172 bbl. above original August allowable. . . . Increase achieved by setting 15 producing days for the 30-day month. . . . Purchasing companies evenly split between 15-day and 14-day patterns. . . .

GOVERNMENT—The newly assumed power of the FPC in matters relating to natural gas comes under heavy fire, but the federal agency doesn't budge an inch. . . . Three big gas producers attack principles laid down in FPC Order 174 and are joined by T.I.P.R.O. . . . FPC stands firm in rejecting request for easing its demand for gas producers' certificates to sell as proof of gas supply in applications for new transmission system. . . . ¶Oil industry's batting average in this session of Congress is good. . . . ¶Only one-half of 1 per cent of oil industry's rapid tax writeoff certificates have been canceled, ODM says. . . .

PIPELINES—Wiley F. Moore, Oil Basin Pipeline Co. director, reveals plans for five more pipeline projects, two of them involving new refineries. . . . Moore's plans include one products line in northwestern North Dakota and four crude lines in Montana, Wyoming, Colorado, New Mexico, Arizona, and Texas. . . . ¶First products arrive in West Memphis, Ark., via the new 475-mile Mississippi River Products line from Duncan, Okla. . . . ¶Last link in 540-mile Yellowstone line from Billings, Mont., to Spokane, Wash., is completed and products are flowing. . . .

DEEP DRILLING is capturing much of the spotlight in today's oil scene, but Ohio Oil Co.'s 21,482-ft. hole in Paloma field southwest of Bakersfield is holding its own as the champion of deep wells. The Ohio well, which was spudded in 1951, was being tested at 16,500-16,700 ft. last week. For a review of the current drilling situation turn the page. On page 95 is a story covering the current deep drilling program.

PETROCHEMICALS—"Ethylene row" at Orange, Tex., continues to grow as Spencer Chemical progresses with construction of a polyethylene plant at the new Gulf Coast petrochemical center. . . . Spencer plant is third new resident of area and Goodrich-Gulf Chemical may join the parade. . . . All are fed by an ethylene pipeline from Gulf Oil Corp.'s Port Arthur refinery. . . . Standard Oil of Ohio will enter petrochemical field with anhydrous ammonia plant in the Toledo-Lima, Ohio, area. . . .

DRILLING—Competition is forcing some big changes in today's drilling industry. . . . Contractors are making hole 44 per cent faster than in 1941, but prices are at the same level. . . . ¶Deep drilling record will be set in U. S. this year. . . . At end of July, 345 wells below 12,500-ft. mark had been completed and 155 tests are projected for this level. . . . Previous record for deep holes was set in 1953 at 440 wells. . . . ¶Tide Water spuds Venice dome test in Plaquemines Parish. . . . Well is projected to 17,000 ft., which would be record for Venice dome. . . . ¶Texas depth record topples as Gulf Oil's 1 Preston G. Northrup 24 miles southeast of Pecos drills to 18,090 ft. . . .

INTERNATIONAL—Iranian Government reveals plans for an ambitious program of land reclamation, agricultural and mineral development and general national improvement to be financed by renewed oil income. . . . ¶Pipe is arriving at Karachi for the first gas-transmission line in the Southeast—the line from Sui gas field to Karachi. . . . ¶Tanker slump is here to stay. . . . Surplus tonnage is causing trouble. . . . ¶United British Oilfields completes crude line serving two fields in Trinidad. . . . ¶Lucky Strike Drilling Co. stakes first wildcat in Maryborough basin of Queensland in Australia. . . .

REFINING—Largest Model IV cat cracker ever built is dedicated at Standard of California's El Segundo refinery. . . . The $20,000,000 unit is first cat cracker for the refinery. . . . World's largest Platformer goes on stream at The Texas Co.'s Port Arthur refinery. . . . Second similar unit is under construction at the same refinery. . . . The new unit combines with a Unifining unit for preparation of feed stock. . . .

Shallow-Hole drilling, such as this 1,400-ft. Northeast Oklahoma well, is feeling the brunt of the stiff competition in today's drilling business, but . . .

Deep-Hole drilling also is feeling the pinch of price cutting. This big rig was drilling below 12,500 ft. last week for Stanolind Oil & Gas Co. in Midland Farms field, West Texas.

Honeymoon Is Over Now That . . .

. . . Drilling Is Big Business

Carl J. Lawrence

TULSA.—The drilling industry is shedding some of its back-slapping in favor of pencil-pushing to meet the demands of today's highly-competitive market.

The extrovert who used to sell his services by selling himself is moving over for a newcomer who can read a cost index as quickly as a drilling chart.

The best way to make money in today's market is to beat the time contracted for a well. But, landing a contract takes more than a few friends in the various production departments. You don't negotiate over the telephone, or at lunch, or cocktails. You submit a bid and hope that no one has figured costs closer than you and come up with a lower bid.

The president of one large firm cites a case in which his firm won a contract for a 9,200-ft. well with a bid that called for completion in 44 days. Once the contract was assured, an engineering huddle was held to cut the drilling time. By compounding mud pumping, the company was able to knock 9 days off the contracted time and complete the well in 35 days. Such maneuvers are necessary to come out and stay on top of the business.

Competition . . . Several developments are effecting this change in the drilling industry, but all are the offshoot of competition. As this competition increases—and it shows no signs of weakening — the change will be extended.

The current drilling scene shows the result of this competition; the contractors are expected to set a record of about 200,000,000 ft. during 1954 with fewer rotary rigs operating than in 1953. Competition has forced them to make hole faster.

The rate-of-penetration increase has been accomplished with new drilling equipment coupled with some new engineering ideas. The industry-wide adoption of jet bits since World War II and wider usage of bigger drill collars are among the reasons for the stepped-up rate.

According to the American Association of Oilwell Drilling Contractors, the rate-of-penetration has increased 44 per cent since 1941 (see accompanying chart).

Home office changes . . . Probably the biggest changes in today's drilling industry are found in the home office, not at the drilling site. Today's big contractor has an engineering staff, salesmen beating the bushes for contracts, and an accounting department that supplies figures to tell him where he is and guide him in future decisions.

Some of the veteran drillers admit they used to run their businesses mainly over the telephone, and agree their rigs probably would be stacked permanently if they operated with such methods today.

One recalls he used to call operators and negotiate a deal solely over the

telephone. It was a case of "he knew what we could do and we knew what he wanted."

"Sometimes the well would be completed before we signed a contract," he added.

The head of another big company says his predecessor claimed he could keep the company in business by "just picking up the telephone." This was shortly after the war. It would be impossible to operate a large firm in such a manner today.

An increase in unit operations also has ruled out the old procedure of landing contracts in a field by drilling the discovery well. In today's bid-controlled market, the only reward often given a contractor who drills the discovery well is a chance to bid for the first stepout.

Personalities are involved to some extent, but the financially-able contractor, regardless of his size, has an even chance at winning the contract for most of the wells drilled today.

Price fights . . . Severe price cutting has accompanied the increased competition. It has been termed the worst in the history of the industry.

Most of the contractors are meeting the price cuts. Some are selective about where they place their rigs at reduced prices, but say they must meet the cuts to keep the rigs active. The price cutting is most severe in shallow drilling, but also is being felt in deep-hole bidding and offshore operations.

Some contracts are being let at such a low rate that the contractors are "just swapping dollars" with supply companies rather than making a profit.

One contractor said he was "living off" deep holes while the smaller drillers fight it out for contracts for shallow hole. The difference between his bids and those of his competitors who are cutting prices is the depreciation cost of rigs, which range from $100 a day on a small rig to $250 a day on a large rig.

The present price cutting is traced to Spraberry field when an influx of new drillers entered the business. Once the Spraberry play subsided, the newcomers found themselves with monthly equipment payments to meet and no holes to drill. They found it expedient to cut prices.

Some of the smaller operators have been forced out of the business, but their rigs have been taken over by other newcomers.

"We think we'll outlive them, but the minute they die, someone is ready to take over their equipment," one big contractor moans. His firm junks worn out rigs rather than disposing of them otherwise. Junking the rigs prevents them from being repaired and placed in competition with the company's new equipment.

The contractors say they can absorb the price cuts in day rates more easily than the footage cuts, but one big driller can show where he made less on the day-rate portion of a well than he did on the footage portion.

This same contractor says he thinks he should make 10 per cent net after taxes.

"I can tell you for sure that we haven't made that kind of money the last 2 years. Our auditor, however, told us that of the 40 drilling contractors he works for that we're making more than the rest."

Low demand . . . Another major factor affecting today's drilling is the low demand for crude. Continued high imports that have resulted in low allowables also have caused a drop in drilling.

The contractors say there is no incentive to find oil other than to establish reserves. One contractor says one of his major customers has reduced offset drilling while another says one of his clients is drilling only those offsets forced by lease agreements or for conservation.

"I was told there's no need to drill a new well and put it on a 23-day allowable," a driller said.

The future . . . The drilling business is facing a tough future, with offshore operations expected to determine what lies ahead.

The small contractor who cut prices to keep his rigs active was gambling that drilling would pick up within a few months and enable him to boost his prices to a profitable basis. This in-

You Get More Hole for Less Money

(All Figures in Percentages)

	1941	1945	1947	1948	1949	1950	1951	1952	1953	1954*
Drilling Prices (Footage Basis)	100	115	110	105	101	100	103	103	102	100
Rate of Penetration	100	105	115	120	125	135	140	141	142	144
Labor Costs	100	140	150	170	180	190	196	197	198	200
Equipment Costs	100	110	132	145	160	175	180	183	188	190
Miscellaneous Costs	100	120	160	165	170	175	181	185	188	191
Total Rotary Drilling Costs	100	122	145	160	170	180	186	189	192	194

***Estimated by A.A.O.D.C.**

Cartoonist's View of Drilling Competition

© The Oil and Gas Journal.

"Sure we'll drill a well for $25,000—if we don't care about the formation, the location, the depth, the labor—and going broke."

crease isn't expected during the remainder of 1954—and may not come at all.

It has been predicted that offshore drilling will cause severe reductions in inland development, forcing added hardships on the small contractor. A prerequisite of offshore drilling is good equipment and lots of it. This will make such operations prohibitive to the small contractor.

Offshore programs are about five times as expensive as inland development. This may force producers to retard their inland programs. A reduction in inland activity is even more likely since the producers will primarily be establishing reserves rather than increasing their productions.

The answer to the drillers' woes may lie in acquiring production. Some have offset their drilling losses with production, and others are considering similar steps.

Completions up . . . While rotary rig activity has been down slightly during 1954, completions have shown a sizable increase. At midyear, completions were up 2,741 wells or 12 per cent over the first 6 months of 1953. Completions are expected to drop slightly during the last half of the year since 228 fewer field development and wildcat wells are planned.

An increase in wells shallower than 7,500 ft. is the principal reason for the increased completions with fewer rigs. While completions jumped 12 per cent during the first half of 1954, an average of about seven fewer rigs were running weekly.

This shallow drilling has been predominate in Colorado, Illinois, North Louisiana, Oklahoma, and North Central Texas. Numerous wells have been on production within a week after spudding, and some cases of completions 72 hours after spudding were reported in Pine Island field, North Louisiana.

Of the 25,904 completions made during the first half of the year, 30.4 per cent or 7,877 wells were less than 2,500 ft. in depth. Wells less than 5,000 ft. in depth totaled 18,086, or 69.8 per cent of the 6-month total. Eighty-nine per cent or 22,936 of the completions during the first half of the year were wells less than 7,500 ft. in depth.

While the drillers are scratching their heads in an effort to cut costs, they know they can wrap up their woes in one package—competition.

The story told by the head of a Tulsa firm illustrates the point. When he was queried about whether he was meeting stiff competition, he smiled and admitted he had been thinking of writing his drillers a memo, asking them not to get off the rig more than twice a day.

"Everytime you take your hand off that brake, you're losing money. Getting off the rig once a day is costly, but if you ever get off twice a day you'll end up in the hole."

Big Unit on Stream

Texaco refinery operates largest Platformer built

PORT ARTHUR, Tex.—The world's largest Platformer, with a capacity of 20,000 bbl. per stream day, has gone on stream at The Texas Co. refinery here.

The unit, first of nine Platformers contracted for by The Texas Co. for refineries in the United States, also is the first in the world to be combined with a Unifining unit for preparation of feed stock.

The combination Platformer-Unifining unit is designed to charge straight-run gasolines to produce a high-octane motor-fuel blending component. It also is designed so it can run on a blocked-out operation for production of aviation base stock.

Used in pretreating feed stock prior to Platforming, the Unifining unit permits the refinery to handle a wide variety of stocks. Excess hydrogen from the Platformer is used in the Unifiner.

Universal Oil Products Co. designed, engineered, and licensed the combined unit. The installation was built by Procon, Inc.

Another Platformer similar to the one just completed is now under construction at the Port Arthur refinery and is scheduled to go on stream in 1955.

In addition to the nine Platformers ordered by The Texas Co. for refineries in this country, a tenth is being built at the Montreal refinery of McColl-Frontenac Oil Co., Ltd., a Texaco subsidiary.

Unions Get Merger Plan

WASHINGTON.—A proposed constitution merging the Oil Workers International Union with the Gas, Coke and Chemical Workers Union will be presented to members of the two organizations for their ratification at separate conventions this fall.

The constitution, approved last week by rank-and-file committees representing the two C.I.O. unions, will be submitted to the chemical workers at their convention in St. Louis September 13-16. The oil workers will meet November 15 at Cleveland to consider the merger formula. If approved by the two unions, the constitution will be submitted later to a merger convention.

C.I.O. officials estimate the new union would have approximately 200,000 workers, of whom nearly 130,000 are claimed by O. A. Knight, president of the O.W.I.U.

Petrochem Newcomer

CLEVELAND.—Standard Oil Co. (Ohio) will build an anhydrous ammonia plant in the Toledo-Lima area as the firm's first venture in petrochemicals.

A site has not been selected, but construction is expected to begin in September with completion slated late in 1955. The plant will have a daily capacity of 300 tons of ammonia. About two-thirds of the ammonia will be used to produce 125 tons of urea, 60 tons of nitric acid, and more than 200 tons of nitrogen solution per day.

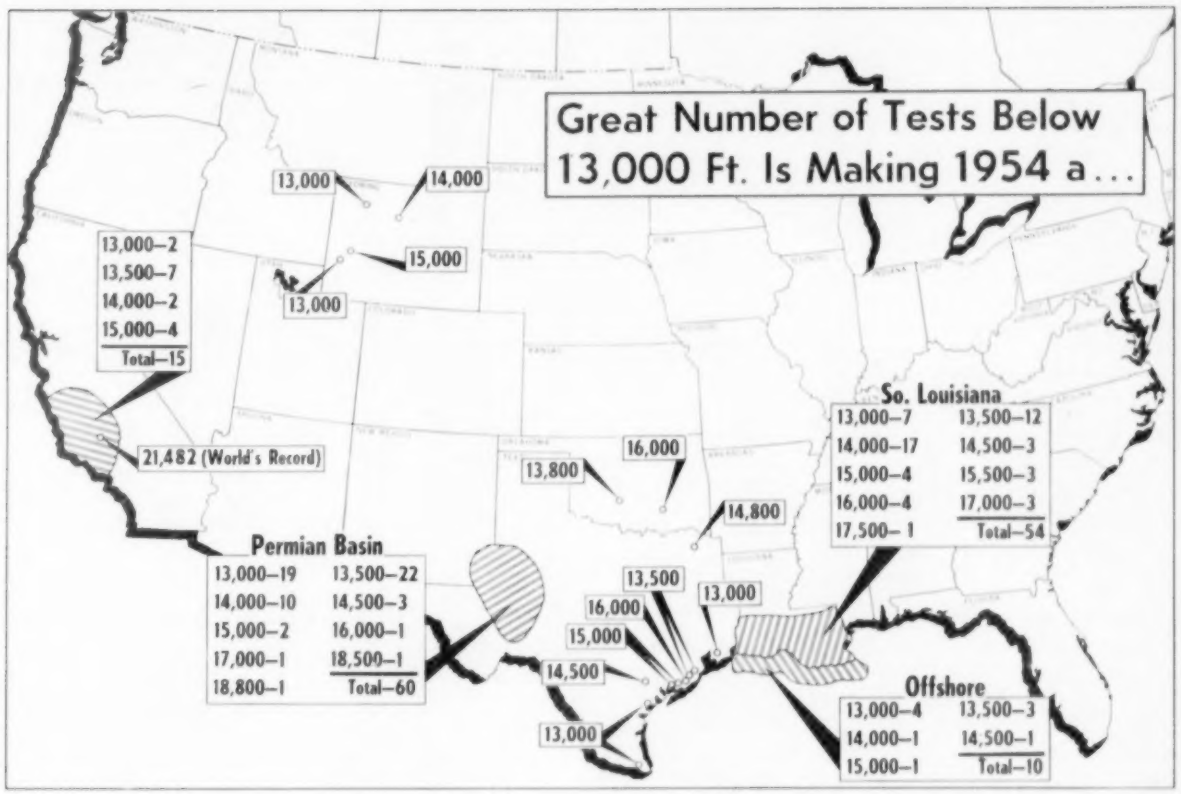
M. W. Kellogg Co. will construct the plant, which will cost an estimated $17 million.

Industry Briefs

LOS ANGELES.—Shell Oil Co. has completed a major expansion project at its Brea natural-gasoline plant in the eastern Los Angeles area. Costing approximately $550,000, the work doubled the plant's gas capacity to 25,000 M.c.f. Its natural-gasoline recovery was increased from 42,500 gal. daily to 70,000 gal. Work included revisions to the existing distillation unit, additional absorption and compressor units, heating and heat-exchange equipment, and additional storage facilities.

DALLAS.—Leonard Nichols, Dallas, has purchased 15 oil producers in West Roberts pool of Lea County, New Mexico, from Ohio Oil Co. and C. T. McLaughlin, Snyder, Tex. Ohio owned eight of the wells, McLaughlin the other seven. Purchase price was $185,000. Nichols bought production rights only to a depth of 5,000 ft.

WASHINGTON. — Texas Eastern Transmission Corp. has filed an application with the Federal Power Commission to reconvert the Little Inch line to products service. Texas Eastern proposes to convert a 1,168-mile section of the 20-in. line to products service and to offset this loss in natural-gas transmission facilities with a 382-mile, 24-in. extension of the Big Inch line *(The Oil and Gas Journal, August 2, page 56).*



Record Year for Deep Drilling

. . . And the trend will continue

Frank J. Gardner

DEEP drilling, latest trend in the search for new oil reserves, will topple all previous records in the United States this year.

At the beginning of August, 345 wells had been completed below the 12,500-ft. mark, and 155 tests projected below that depth are now active. This total of 500 already exceeds the 440 deep-hole completions of 1953.

If this deep-drilling rate continues, and it is more likely to be accelerated than arrested, by the end of the year the 1954 figure is expected to stand near 550.

The significance of this trend to deeper drilling is inescapable. Geologists believe that the future of oil exploration in the United States lies in four principal directions, three lateral and one vertical. The Rocky Mountains, the Continental shelves, and the southeastern states provide our greatest promise of future fields, in order of reserve promise as well as of time. These are the "lateral" phases of future exploration.

The fourth is vertical. There is reason to believe that oil reserves will be found to depths of 20,000 ft. Below that, geologists are a bit timid about predictions. In 1915, they believed that tests below 8,000 ft. would find rocks so tight that they couldn't possibly carry oil or water. Now, the "limit of possibilities" has been pushed down to 20,000 ft. Who knows how far it may go in another 40 years?

The three deepest wells in the world have gone to 21,482 ft. (in California), 20,521 ft. (in Wyoming), and 20,450 ft. (in Mississippi). The deepest, Ohio Oil Co. 72-4 K.C.L.-A in California's Paloma field, is still on the active list, but has produced no oil for the record yet. The Wyoming test was dry, and nobody is quite sure what transpired in the notorious Vasen 1 Fee of Mississippi. It appears certain that 20,000-ft. production is still far in the future.

But, only illogical conclusions could be drawn on the basis of three widely separated tests. As in the public opinion surveys, hundreds of tests are necessary on which to base any judgment. And they are coming. The chart on depth trends from 1949 to 1954 clearly shows the tendency to deeper tests in greater numbers. It may be that the industry will find it entirely economic to produce a well from 5 miles down.

The producing wells at North Coles Levee, California (17,892 ft.), Weeks Island, Louisiana (17,306 ft.), Puckett, Texas (15,000 ft.), Cogar, Oklahoma (14,510 ft.), and Natrona, Wyoming (14,307 ft.), provide more comprehensive evidence of things to come, and indicate the pattern that future discoveries may be expected to follow.

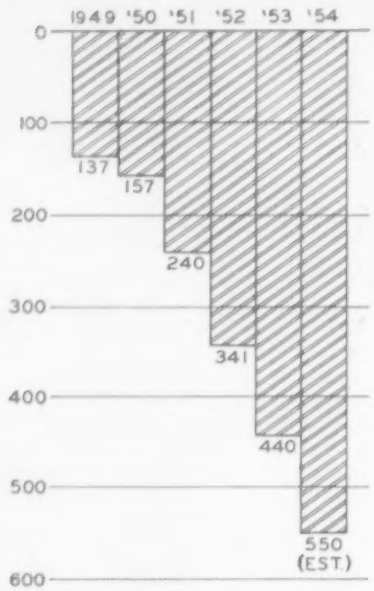
Shown on the accompanying map are the currently active wells projected to 13,000 ft. or more. The heaviest concentration of activity is in South Louisiana and in the Permian basin of West Texas and southeastern New Mexico. The Louisiana coast country has become quite accustomed to producing strings longer than 16,000 ft., and 1954 developments in West Texas have emphasized the potency of the Ellenburger formation at depths of 12,000 to 15,000 ft.

In Oklahoma oil-producing depth records have fallen during the past month as Oil Creek production was discovered at 13,800 ft. Wyoming is witnessing new and urgent interest in its deep possibilities as four rigs probe its basin areas to 14,000 and 15,000 ft. The Texas Gulf Coast is spotted with deep tests, and the old Balcones Fault trend is being actively exploited to depths never before anticipated.

California is the third most active area with respect to deep drilling. New pays are being sought between 14,000 and 15,000 ft. in Fresno, Kern, and Ventura counties.

How deep can they go? No doubt, there is a limit beyond which we cannot logically expect accumulation of oil and gas in quantity, but the criteria for determining that limit have not yet evolved. Mechanical limitations and economic considerations are the only restricting factors at the moment. Certainly, the presence of 65,000 ft. of drillable sediments in California, 40,000 ft. in the Washington-Oregon area and in the Green River basin, 25,000 ft. in the Anadarko basin, and 30,000 ft. on the Gulf Coast offer no veto by nature of ever-deeper exploration. The chief limiting factor at present is man's inability to sink a 5-mile hole.

Completions Below 12,500 Ft.



Moore announces plans for

Five Pipeline Projects

ATLANTA.—Plans for five pipeline and two refinery projects were disclosed here last week by Wiley F. Moore, one of the promotors of Oil Basin Pipeline Co.

The five include a products line serving northwestern North Dakota and four crude-oil lines involving Montana, Wyoming, Colorado, New Mexico, Texas, and Arizona. The projects are:

. . . A 200-mile, 6-in. products line from Glendive, Mont., to Minot, N. D. This would move products from a connection with Oil Basin Pipe Line Co.'s line now under construction from the Billings-Laurel area to Glendive. The Oil Basin line is scheduled for completion October 15.

. . . A 350-mile, 16-in. crude-oil line from Glendive, Mont., to Guernsey, Wyo. This line would connect with Platte Pipe Line Co.'s line. Moore said plans have not yet been discussed with Platte and arrangements have not yet been made with Montana producers. The project would involve laying 150 to 200 miles of gathering lines in the Glendive area.

. . . A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This would serve a proposed 10,000-bbl. refinery now being planned by M. M. Frost, Dallas, and associates.

. . . A crude-oil line from Guernsey, Wyo., to Albuquerque.

. . . A crude-oil line from Albuquerque to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery also being planned by Frost and associates.

Moore has applied for accelerated amortization on the products line under the name of Moore Stoner Co., and is connected with applications for fast tax writeoffs on the other projects.

Applications for the Glendive-to-Guernsey and the Wink-to-Albuquerque lines have been filed under the name of Standard Pipe Line Co. The Guernsey-to-Albuquerque and Albuquerque-to-Phoenix applications have been filed by Armex Pipe Line Co. Accelerated amortization also is being sought for the two proposed refineries.

Moore explained that the tax applications were made in order to get priority in consideration of rapid amortization. The companies are asking a rapid amortization on 25 per cent of the cost of the pipelines, 40 per cent for tankage, and 50 per cent for refineries.

In connection with the proposed products line, Moore said he has not discussed the project with local refiners but that he anticipated moving products from their plants.

Ebasco Services, Inc., New York engineering firm, is now doing the engineering work on the pipelines and refineries.

Moore's plans for a crude line out of the Glendive area will be watched with particular interest. Reports have been current in the industry that Platte Pipe Line Co. has been considering extending its system to serve the fields of eastern Montana.

Moore retired this year from the management of Wofford Oil Co., products distributor in the Southeast for Pure Oil Co. He is president of U. S. Oil Co., a producing company operating in Texas, Oklahoma, and Louisiana, and is a director of Oil Basin Pipe Line.

"Big-Big Inch" Pipe Ordered

ORANGE, Tex.—A new "big-big inch" era was ushered into the gas transmission industry last week when Transcontinental Gas Pipe Line Corp., Houston placed an order for 50 miles of 36-in. pipe with Consolidated Western Steel Division of U. S. Steel Corp. at its plant here.

The pipe will be part of the 231 miles of 36-in. which Transco plans to lay in its 500-mile expansion and looping program along its Texas to New York line.

Pacific Gas & Electric Co., now laying or planning 200 miles of 34-in. pipe, is the only firm which presently makes much use of pipe over 30-in.

In line with the swing to larger pipe and fewer loops, Trans Canada Pipe Lines, Ltd., plans to use 36-in. pipe on part of its line from Alberta to Toronto.

Products Line Initiated

WEST MEMPHIS, Ark.—The first products to be delivered through the new, 475-mile Oklahoma Mississippi River Products Line, Inc., arrived here last week from Duncan, Okla., western terminus of the line.

This first shipment was distillate from Sunray Oil Corp.'s Duncan refinery. Sunray owns 50 per cent of the new line.

A new company, Valley States Oils, Inc., Memphis, was formed by Sunray and Kerr-McGee Oil Industries, Inc., to market products shipped through the line. The line has a capacity of 44,000 bbl. daily.

FPC Power Questioned . . .

WASHINGTON. — The Federal Power Commission received a barrage of protests this week over its order placing all natural-gas producers under regulation.

Three big producers—Magnolia Petroleum Co., Ohio Oil Co., and Humble Oil & Refining Co.—filed petitions for rehearing on Order 174 and subsequent Order 174-A, which modified a portion of the original order. Each company presented its position differently.

The Texas Independent Producers and Royalty Owners Association also attacked the FPC order, petitioning the commission to suspend its order until individual hearings can be held to determine which producers should be regulated as natural-gas companies.

Companies object . . . Humble told the commission it "has none of the characteristics of a public utility and has no desire or intention to become a natural-gas company subject to the jurisdiction of the commission." The Humble petition pointed out the order prohibits escalator clauses in gas contracts unless they are presented to the commission for approval as "changes in rate."

The commission's jurisdiction is based on these contracts, the Humble petition said, but the FPC order "refuses to recognize prices agreed upon by the parties to the contract and seeks to reduce the agreed prices."

Magnolia also contended it is not a natural-gas company within the meaning of the Natural Gas Act as interpreted by the Supreme Court in the Phillips case.

Magnolia charged the order is in conflict with Texas' conservation laws and that it prohibits gas producers from passing any increases in production taxes on to the purchasers. The company cited how Louisiana imposed a 1-cent production tax September 22 and how Texas has increased its production tax effective September 1. While the order prohibits passing on these taxes, most gas supply contracts carry provisions for such absorption of taxes by the purchaser, Magnolia's petition said.

Ohio Oil admitted it is an independent producer as defined in the order, but claims the FPC is unlawfully depriving the company of property rights under contracts now in force with natural-gas companies for the sale of gas in interstate commerce.

If the orders are not set aside pending reconsideration, Magnolia urged that the effective day be postponed indefinitely while Humble and Ohio asked a stay of the provisions requiring them to file rate schedules on sales made under contracts in effect June 7. Humble and Ohio want the effective date postponed from October 1 to June 1, 1955.

Two small producers—Houston Oil Co. and American Republics Corp.—also have filed petitions for rehearing.

So does TIPRO . . . TIPRO argued that the hearings to determine which producers may be regulated could be held individually for the "approximate 61 companies accounting for some 80 per cent of all gas being sold in interstate commerce." TIPRO said hearings could be held by categories for the several thousand smaller producers.

The association also requested that the FPC hearing scheduled November 4 on escalation and "favored nation" clauses in gas-sales contracts be broadened to include "questions and problems arising out of the commission's order No. 174. . ."

Future action . . . The immediate battle will be to obtain a rehearing on the order from the FPC and to secure a rehearing of the Phillips case in the Supreme Court.

Regardless of what the commission and the court do, it is certain the natural-gas industry will ask Congress next year to rewrite the exemption granted independent producers and gatherers in the Natural Gas Act.

Meanwhile, if the commission goes ahead with its attempt to bring the producers under regulation it will be met with one challenge after another in the courts.

. . . But It's Still There

WASHINGTON.—Proof of gas supply—as evidenced by petitions of natural-gas producers for certificates to sell—will be the cornerstone of all applications for new transmission systems considered by the Federal Power Commission.

This was emphasized last week when the commission rejected a request of the American Louisiana Pipe Line Co. and its affiliates to go ahead with hearings on other points involved in its Louisiana to Michigan pipeline project while awaiting the submission of applications from the producers who are to supply the gas.

The FPC's new policy was adopted in Order 174 requiring all producers to secure certificates before beginning service to pipelines. The hearings on the American Louisiana application were recessed August 6 because its suppliers had not filed the certificates. They were given until September 13 to submit their applications.

Applications expected . . . In rejecting the plea to dispose of other issues, the commission said its order to recess the proceedings was written in "clear and unambiguous language" that in the absence of applications by the proposed suppliers no favorable action could be taken.

The commission pointed out that while it expects all of American Louisiana's suppliers to file applications by September 13, the failure of one or more of the producers to do so might change the capacity of the system and the volumes of gas available "with resultant effects upon rates, financing and economic feasibility of the projects covered by the interdependent applications."

Proposed line . . . American Louisiana, Michigan - Wisconsin Pipe Line Co., Michigan Consolidated Gas Co., and Texas Gas Transmission Co., have four interdependent applications for construction of approximately 1,625 miles of pipeline *(The Oil and Gas Journal, January 1, page 120)*.

The project, the commission pointed out, is based upon the availability of 300,000 M.c.f. of gas per day. So far, none of the six producers on which American Louisiana is dependent has indicated any intention to file an application.

Washington Score Good

More oil legislation than usual won approval of Congress with tax-revision bill probably most important of session

Bertram F. Linz

WASHINGTON.—The oil industry's legislative batting average in the 1954 session of Congress was the best in a number of years.

A number of bills affecting the industry favorably were enacted. There were no shotgun investigations aimed at belittling the industry or its efforts to serve the public. The industry's relations with Congress also were more harmonious than in past years. This was apparent when oil men induced the Senate to provide the full fund asked for the reconstitution of the Oil and Gas Division after the House had slashed it two-thirds.

Not all of the oil legislation proposed was disposed of by Congress. Several measures, some of them of major importance to oil or gas operators, were deferred for consideration next year, as were some administration programs of interest to the industry.

Top legislation . . . Probably the most important single piece of legislation enacted this year was the tax-revision bill which not only eased burdens on industry generally, including companies operating abroad, but continued the depletion allowance for oil and natural gas at 27½ per cent and wrote into law the option to expense or capitalize intangible drilling costs, previously provided only by Treasury regulations and subject to change.

In approving the expansion of the Oil and Gas Division necessitated by the liquidation of the Petroleum Administration for Defense, Congress gave Interior Secretary Douglas McKay the full $300,000 requested to build up an organization to serve as liaison between all federal agencies interested in oil matters.

Two measures were enacted with the aim of increasing the United States tanker fleet. One authorized the Navy to build five and charter 15 high-speed super tankers to be built by private interests. The other provided for trade-in allowances on World War II tankers turned in, the money to be applied to the construction of new oil carriers. If the full provisions of both bills are carried out, 50 or more wartime tankers will be added to the reserve fleet.

Legislation also was adopted to modernize the administrative provisions of the Mineral Leasing Act of 1920, increase the acreage allowed to be held under lease or option on the public lands and permit the coincidental development of public lands for minerals and oil and gas.

In the field of natural gas, Congress passed the "East Ohio Gas Co. bill" exempting from Federal Power Commission control any company which purchases gas from an interstate pipeline for consumption within a single state in which rates, services, and facilities are regulated.

Those that failed . . . A number of measures affecting oil and gas failed to secure floor consideration, however. Some of these bills will never be heard of again, but others will be reintroduced in the new Congress which convenes next January.

Among the measures which may be revived next year are bills to use the cost of pipeline-company owned natural-gas reserves in setting rates. They are designed to override the Federal Power Commission's ruling that the companies could value such gas at the going field price. A bill authorizing condemnation proceedings to acquire property for the underground storage of gas also is expected to be revived along with a bill to require the FPC to deny applications for the importation of natural gas from Canada.

Other bills which never reached the floor would prohibit pipeline companies from transporting any oil in which they had an interest, require the military services to use domestic oil only, give the Defense Department authority to expand oil production in Naval Petroleum Reserve No. 1 (Elk Hills) in the event of an emergency, reduce the depletion allowance, repeal the submerged land acts returning the tidelands to the states, and revise the rate-suspension provisions of the Natural Gas Act.

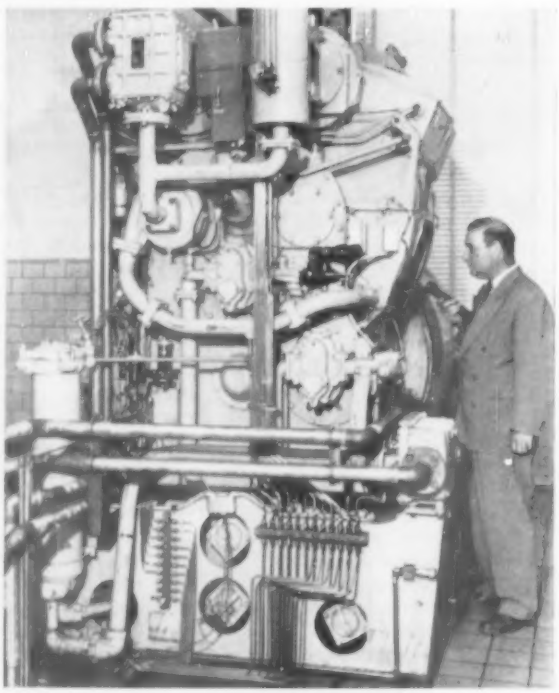
Postponed until 1955 were several administration programs, among them extension and revision of the Reciprocal Trade Act, which will be a major issue, and the streamlining of the antitrust laws, on which a Department of Justice committee has been working for some months.

Tax Decision Appealed

WASHINGTON. — The Supreme Court has been asked to determine whether oil companies can recover severance taxes paid to Louisiana on offshore production during the 3 years preceding the Tidelands Act of 1953.

Superior Oil Co. and Pure Oil Co., seeking to recover $66,000 in taxes paid between June 5, 1950 and May

Scientific "Casey Jones" At Work



Research in railroad fuels and lubricants is conducted by Standard Oil Development Co. at its Linden, N. J., laboratories through the aid of a two-cylinder diesel locomotive built especially for the lab. The engine is the same height as a regular 16-cylinder model, but one-eighth the length. Fuels and lubes can be tested the equivalent of 100,000 miles heavy-duty railroad service by running them in the lab engine a few hundred hours. Engineer N. H. Rickles is inspecting the engine, which was built by the Electro-Motive Division of General Motors Corp.

22, 1953, last week filed a petition for review of a Fifth Circuit Court of Appeals decision. The lower court held the companies liable for the tax on grounds the quitclaim legislation, in effect, says the tidelands always belonged to the states.

Taxes in dispute are those paid to the state between the Supreme Court's "paramount rights" decision placing tidelands under federal control and congressional action surrendering the federal claim to coastal states.

Offshore Insurance

Federal compensation act will reach into tidelands

WASHINGTON.—Operators on the Continental Shelf who will come under the Longshoremen's and Harbor Workers' Compensation Act will be permitted to cover their new responsibilities by either a policy issued by an authorized insurance company or by self-insurance.

The act will be made applicable to offshore operations by the Department of Labor this week. It is one of several federal laws affecting the oil industry under the Submerged Lands Act of 1953 *(Oil and Gas Journal, August 16, page 100)*.

The longshoremen's act provides for the payment of compensation to employes who are disabled or killed on the job. It is similar to the tidelands compensation laws of Louisiana and Texas, but will affect only those operators working in the federally-held portion of the submerged lands.

Policy plan . . . Under the regulations proposed August 4 by the Department of Labor, operators may guarantee their ability to meet claims by taking out policies with insurance companies authorized by the department to write such coverage. The premiums to be charged for such policies are not fixed by the Government but are set by the underwriters in the same manner as are premiums for other forms of insurance.

Self-insurance plan . . . Many of the operators on the Continental Shelf are expected to protect themselves by self-insurance. To obtain authorizations as self-insurors, operators must file applications giving information covering the company's financial structure, safety precautions, health benefits, and accident rate.

Self-insuring operators will be required to make periodic reports on their assets and liabilities, payroll, and payments of compensation to injured workers or their beneficiaries.

WATCHING WASHINGTON

Bertram F. Linz

Atom No Fuel Threat

Industrial development of nuclear power will not hurt oil and other competing fuels.

The atom will not displace conventional fuels, Atomic Energy Commission scientists say. It will come into use alongside of oil, natural gas and coal and the principal effect of developing economic power from nuclear fuel will be to establish a strong restraining force against the pressures toward higher cost of power.

There will be no significant dislocation in the fuel industries, because demands on oil, gas and coal in industries other than power-generation and for domestic uses will far outweigh any share of their market met by nuclear power.

The AEC's analysis of the field for nuclear power is that the demand for oil and gas by 1975, will be so great and prices will have risen so high that oil from shale or synthetic fuels from coal may have become competitive.

The rapidly expanding market of fuels for power and other purposes and the time required for nuclear power development should allay fears that competing fuels may be hurt by the entry of nuclear power into the market.

Elk Hills Swap Eyed

A 2-year-old proposal for a trade of Standard Oil Co. (Calif.) holdings in the Stevens zone of the Elk Hills naval petroleum reserve for an equivalent volume of oil from the shallow zone is under new consideration in the Defense Department.

The offer, made by Standard to get out of the reserve as quickly as possible, is being studied by the consulting firm of DeGolyer and MacNaughton, which is expected to make its report sometime this fall.

Standard, which has large holdings in both producing zones, is operating the reserve under a contract entered into with the Navy in 1944. Production from the field is limited and the company will be tied down for many years unless it can make a deal.

In its offer 2 years ago, the company proposed a barrel-for-barrel trade of the oil in the two zones and offered a bonus in the shape of a $1,000,000 a year expenditure for development of the shallow zone which it is not currently obligated to make under its contract.

The proposal has not met with unanimous approval in all Defense Department circles. It would mean foregoing about $18,000,000 a year now secured in revenue from the reserve.

The big factor which makes officials pause is the knowledge that any arrangement developed would have to pass the scrutiny of the armed services committee, and particularly would have to meet the approval of Rep. Carl Vinson of Georgia—"Mr. Navy." While not currently chairman of the House committee, Vinson exercises a potent influence over its decisions. Any deal that satisfies Vinson will have to insure the Government all that is coming to it, and preferably a little more, and not be merely an arrangement to relieve the department and the company of a burdensome problem.

Barges To Aid Defense

The drilling barge that made oil production from the Continental Shelf possible is contributing to our better defense against enemy attack.

A very similar type of barge is being used for the radar warning system which the Air Force, now responsible for defense, is putting in along the Atlantic Coast.

A number of barges, some 50 or more, will be dropped at intervals north from Norfolk, Va. At least one is as far out as 125 miles from shore. They will have a lighthouse at one end to advise shipping and air traffic of their location; helicopter landing space, quarters and facilities for personnel and radar equipment which will work 24 hours a day.

The experience of the oil industry and the military with barges will be followed with interest by other industries. Already it has been suggested that if they show ability to withstand Gulf and Atlantic storms, platforms might be used for other operations too dangerous or obnoxious to be conducted in inhabited areas along the coast.

Oil Industry Challenged by . . .

. . . Military Shopping List

WASHINGTON.—Uncle Sam has challenged the oil industry to produce gasoline in chunks so it may be more easily transported to the armed forces in case of war.

Jelled gasoline which could be easily reconverted into a liquid is only one of 200 inventions sought by the National Inventors Council to aid in national defense. In case nobody comes up with a solid fuel, however, the armed services would like for someone to invent a portable battery-powered light to facilitate inspection of the interiors of gasoline drums.

The National Inventors Council, established in the Commerce Department in 1940, serves as a clearinghouse for ideas, suggestions, inventions, and developments that might be useful to the armed forces in time of war.

The oil industry, which is asked to fill only a dozen or so of the armchair inventors' dreams, has a relatively easy assignment. Some of the council's other requests are as perplexing as those made by the Internal Revenue Service. They range all the way from a Flash Gordon "death ray" to a substance which will clear an entire landing field of ice and snow within minutes and at temperatures as low as —65° F.

Appeals repeated . . . Some of the items on last week's shopping list are holdovers from previous lists since the military sometimes dreams up ideas faster than inventors can fulfill them.

In the past 14 years the council has received more than 300,000 proposals, some of which have resulted in incalculable savings of men, material, time, and taxpayers' money. Through the council, inventors, scientists, engineers, technicians, and research groups are advised of current military problems and invited to find solutions.

Nearly 600 problems have been listed by the council so far. All but 200 of them have been solved or dropped, but about half of them remaining have been under study for years and are still far from solution.

Oldest problem on the list is that of fuels and lubricants suitable for use in areas of exceedingly low temperatures. Arctic maneuvers of the Army and Air Force indicate considerable work remains to be done in this field.

"It is desirable to have a fuel oil that will not separate or disassociate under low temperatures or become solidified as is the tendency with present diesel fuel oil," the council states in its latest appeal. "An ideal diesel fuel oil would be one that would not appreciably lose its physical and chemical characteristics at —65° F."

The council also says it would like to have a lubricating oil which would maintain satisfactory viscosity in extremely cold weather and have a pour point of about —60° F. Solid lubricants are being sought that will allow free movement of bearings at —65° F.

If you're a frustrated inventor, you might try your hand at these:

. . . **A neoprene substitute** which will not get brittle at —70° F., yet will be oil resistant.

. . . **A diaphragm** to separate high-pressure gas up to 2,000 lb. from oil. The diaphragm must permit absolutely no diffusion of gas through it, in order to meet the council's specifications.

. . . **An automatic gasoline nozzle** which is rugged, simple in design, lightweight, and capable of operating in any climate.

. . . **A portable kit** of gas analysis equipment permitting positive identification of industrial and other compressed gases.

. . . **Coupling** for gasoline pipelines, strong, lightweight, and requiring less time to assemble and disassemble than present types.

. . . **Rubber** or rubber-like materials which will maintain their functional properties at temperatures from —65° F. to 160° F. and be fuel and chemical resistant.

. . . **A suitable oil for oil sterilization,** having a high flash point (400° F.). The military would like for this substance to have only slight vaporization, to be odorless, and to be a good lubricant for small bearings and gears operating at 20,000 r.p.m. with a 3-lb. load. In addition, it should be nonirritating to human tissues, noncorrosive to metals, and inexpensive, the council says.

. . . **method for decreasing** the specific fuel consumption of gas turbine engines.

. . . **rugged, compact,** high-power gas driven servo capable of operating in a severe environment

. . . **A low-cost, easily applied RF coil** impregnant in the form of a wax, varnish, or resin, capable of protecting the "Q" of a coil after exposure to low or high temperature (125° C. to —62° C.) and high humidity.

Any inventor, professional or amateur, who has an idea for solving any of these problems is invited to submit it to the National Inventors Council, Department of Commerce, Washington 25, D. C.

The council emphasizes that it is looking for new developments, not products that are already available, since the armed services usually are aware of these.

Import Peril Cited

Sen. Daniel warns he will ask congressional action

WASHINGTON. — The problem of oil imports was dropped in the lap of President Eisenhower's committee on energy supplies and resources this month by Sen. Price Daniel of Texas.

Daniel told the Senate the problem is an appropriate subject for study by the committee, which is to make recommendations to the President for legislation laying down a fuels policy.

In a lengthy explanation of the domestic producers' present situation, Daniel read to the Senate a letter from Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission, charging that imported oil was responsible for the excessive inventories of crude and products that forced Texas to cut back production by 310,000 bbl. between June and August.

"It seems obvious that when the greatest oil-producing state in our nation is compelled to shut down more than one-half of the time during the midst of the big gasoline-consuming season, certainly imports are supplanting domestic production to the detriment of our state's economy and vitality adversely affecting the revenues of our state," Thompson declared.

"This sort of situation must not be allowed to continue, because it will mean the discouragement of drilling in this country and will endanger our supply of oil for defense of our country. We cannot depend upon foreign oil for national security because, come war, foreign oil would be denied us through the sinking of tankers."

Credit due . . . Daniel told the Senate the importing companies should be given credit for "the extent to which they have reduced imports by practicing industrial statesmanship," but declared that "only additional voluntary reductions by importers of foreign oil will solve this problem without legislation."

If the industry does not do that, he

warned, he will advocate action by Congress.

"Let me make it clear," Daniel said; "I realize that we must keep Middle East oil from going to Russia. We must receive some imports to supplement domestic production. However, it is equally important that we preserve and protect our domestic oil industry. It will serve no useful end for America to save the economy and oil industry of the Middle East if it is done in a manner that would destroy the economy and national defense potentialities of the United States.

"Other Middle East countries must reduce their total output of oil proportionately so as to absorb the Iranian production when it is resumed. The total imports from the Middle East must be kept within present figures, or reduced.

Oil Follows Through

ODM cancels only half of one per cent of all accelerated amortization certificates granted oil industry since 1950

WASHINGTON.—The oil and gas industries are carrying out their commitments to expand facilities for which they have received certificates for accelerated amortization.

This was disclosed last week in a report by the Oil and Gas Division of the Interior Department showing that only about ½ of 1 per cent of the certificates issued by the Office of Defense Mobilization have been canceled, either at the request of the applicant or because of failure to comply with requirements.

The OGD report showed that up to the close of July the ODM had certified 1,736 projects with an aggregate estimated cost of $4,500,956,000. Of those certificates, only 83 for projects to cost $269,958,000 have been canceled.

One-fourth of the cancelations were for basic refining facilities—22 projects with a proposed capacity of 109,000 bbl. daily and a cost of $104,987,000.

Other cancellations included 14 natural gas processing projects involving 11,000 bbl. daily; six natural gasoline storage products for 440,000 bbl.; 12 crude and products storage projects for 2,500,000 bbl.,; one pipeline; nine alkylation projects for 16,000 bbl. daily; six aromatics projects for 10,000 bbl. daily; two tetraethyl lead projects; two lubricating oil projects for 5,000 bbl. daily; one lube oil additive project for 1,000,000 lb. per month; one catalyst project for 6,000 tons per month; and three petrochemical projects, $32,654,000.

Certificates issued through July 30, including those canceled, were as follows:

... **Natural gasoline processing,** 179 projects for 292,000 bbl. daily; wet gas gathering systems, 19 projects; natural gas storage, including underground, 47 projects for 5,317,000 bbl.

... **Crude oil and products** storage, 451 projects for 111,060,000 bbl.; crude and products pipelines, 165 projects for 30,051 miles.

... **Oil-field equipment,** 7 projects.

... **Basic refining** facilities, 465 projects for 1,818,000 bbl. daily; alkylation, 94 certificates for 103,000 bbl. daily; aromatics, 44 projects for 55,000 bbl. daily; sulfur, including natural gasoline projects, 44 projects for 489,000 long tons per year; tetraethyl lead, 21 projects for 223,000,000 pounds per year; lubricating oil, 13 projects for 19,000 bbl. daily; lube oil additives, 23 projects for 11,000,000 pounds per month; cracking catalyst, 17 projects for 55,000 tons per month; petrochemicals, 37 projects.

Since the expansion program was undertaken in 1950 a total of 2,212 applications for rapid amortization of oil and gas projects to cost $6,164,520,000 have been filed. Of this number, 87 were withdrawn, 294 have been denied and 95 are in process or under review.

Crude May Go to Russia

WASHINGTON.—The embargo on crude-oil sales to Russia and her satellites may be lifted soon.

Revision of the embargo list was recently completed by the 16 nations which ban exports to Communists of goods that might contribute to Russia's military strength. A ban, however, is expected to remain on selling oil field and refinery equipment to the Reds.

No substantial sales of crude oil are expected to result from lifting the ban since Russia exported 17,000,000 bbl. of crude last year. It is doubtful that the Reds are in the market for imported crude.

However, Foreign Operations Administration Director Harold E. Stassen has warned that Russia's oil exporting may be part of a plan to split the democratic nations and demoralize normal international trade.

Imports, Exports Up

Total imports show gain of 89,000 bbl. over May

INCREASES were recorded for both imports and exports during June.

Total imports averaged 1,052,000 bbl. daily during the month, a gain of 89,000 bbl. daily over May, according to figures of the Census Bureau of the Department of Commerce.

Exports of all oils averaged 358,000 bbl. daily, up 37,000 bbl. daily from May.

Most of the increase in imports was in products, which averaged 371,000 bbl. daily, or an increase of 58,000 over May. Crude-oil imports averaged 681,000 bbl. daily in June, a gain of 31,000 bbl. The crude-oil increase was accounted for by greater movement from Kuwait and Saudi Arabia, plus arrival of crude from Iraq and Qatar, from which no crude was received in May.

The increase in total exports was accounted for by a gain in crude-oil shipments and an increase in exports of all major classes of products except residual fuel.

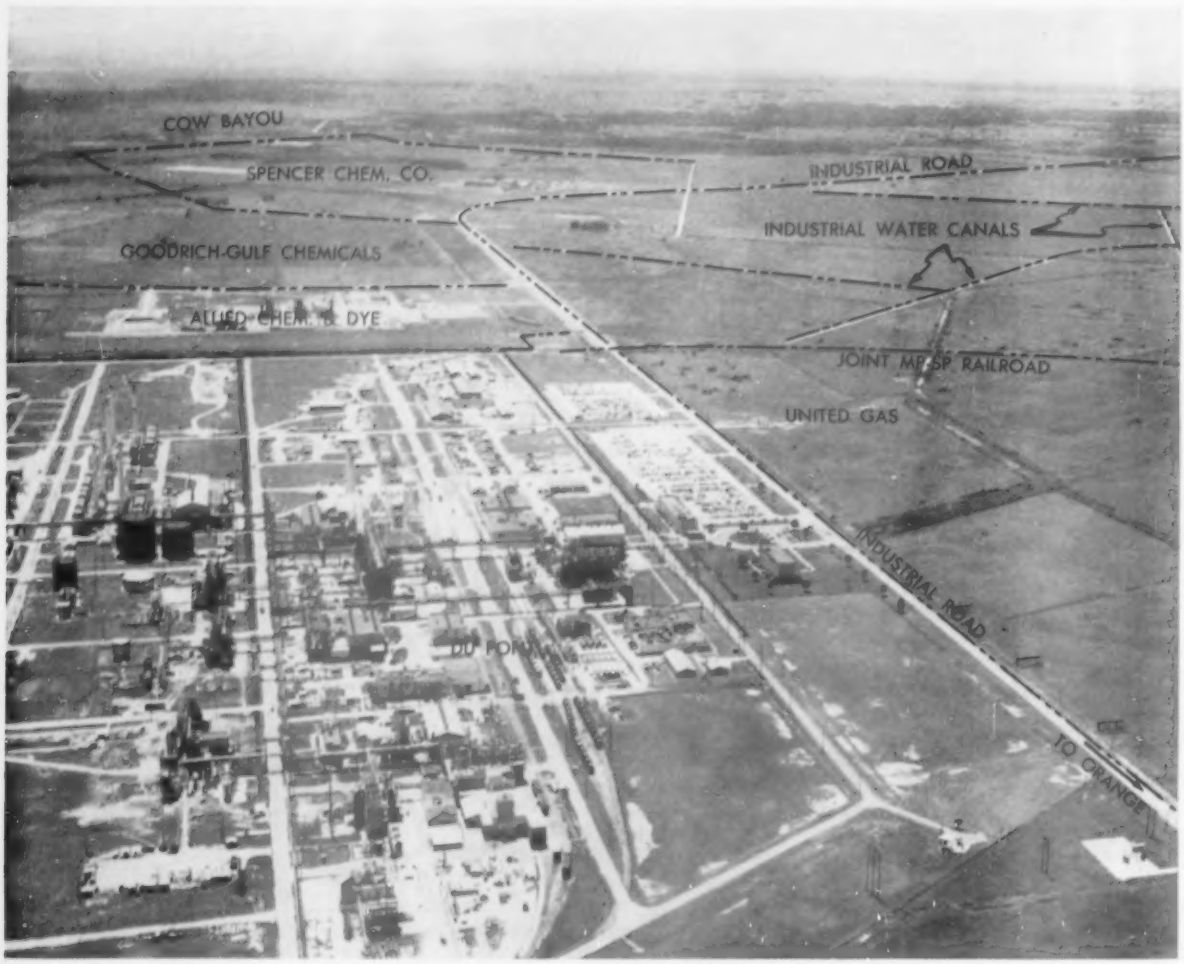
IMPORTS INTO CONTINENTAL U.S.
(Thousands of barrels)

	June 1954	May 1954	June 1953
Crude			
Mexico	206	289	593
Colombia	1,210	1,225	1,260
Venezuela	9,761	10,885	9,408
Peru		128	
Kuwait	4,295	3,463	4,147
Saudi Arabia	3,072	2,613	4,106
Iraq	406		113
Qatar	184		114
Canada	156	138	224
Far East	1,151	1,405	1,594
Total crude	20,441	20,146	21,559
Daily average	681	650	719
Products—			
Residual fuel	9,532	8,566	9,543
Other products	1,594	1,127	755
Total products	11,126	9,693	10,298
Daily average	371	313	343
Total all oils	31,567	29,839	31,857
Daily average	1,052	963	1,062

EXPORTS*

	June 1954	May 1954	June 1953
Crude	1,372	1,258	1,824
Gasoline	2,811	2,318	2,004
Kerosine	228	157	904
Distillate	2,158	1,969	2,718
Residual	1,793	2,006	1,638
Lube oils	1,435	1,289	1,038
Other products	941	934	918
Total all oils	10,738	9,931	11,044
Daily average	358	321	368

*Excludes shipments to territories.



'Ethylene Row' Is Growing

- **Plant under construction by Spencer will be third for Orange area; Goodrich-Gulf may be row's next resident**
- **Gulf adding to Port Arthur refinery in move to provide more feed stock for growing petrochemical center**

F. Lawrence Resen

ORANGE, Tex.—Orange's "ethylene row" is a beehive of activity and is expected to be buzzing for some years to come.

The present big stir in this new Gulf Coast petrochemical center is construction of Spencer Chemical Co.'s polyethylene plant.

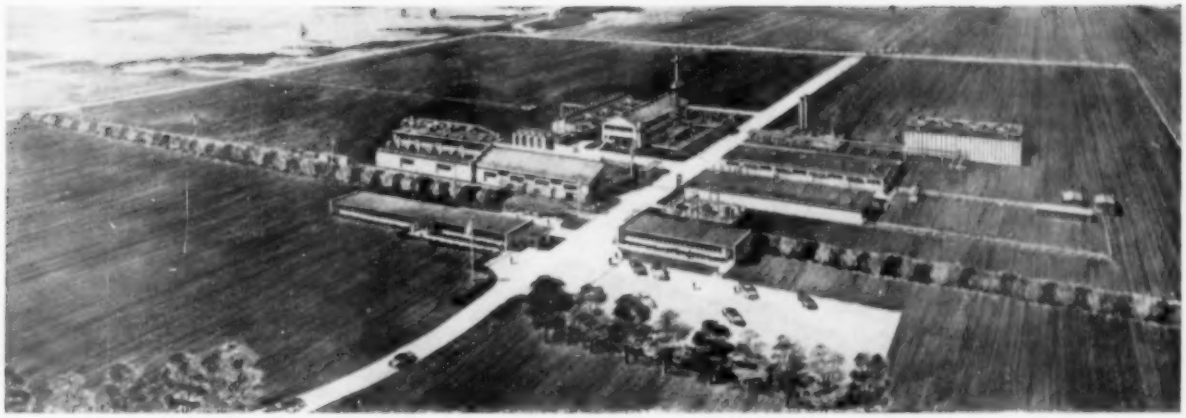
The Spencer plant, which will go on stream next spring, will be the third resident of the row. Like its predecessors, it will be fed through a pipeline from Gulf Oil Corp.'s ethylene facilities at the nearby Port Arthur refinery. A fourth petrochem plant is being considered—and it too will be fed by Gulf.

Gulf also is building. The company is adding another ethylene unit at the refinery. This new unit will jump the present ethylene gas capacity from 7,000 M.c.f. daily to 15,200 M.c.f.

The surge of activity here is mainly attributed to the supply of ethylene furnished by the Gulf pipeline. In addition to the raw material, the area also boasts a healthy labor market, adequate water resources for the processing plants, and good deep-water transportation. Local boosters claim ethylene row is just the beginning of the boom.

Number one . . . Trailblazer in the area was E. I. du Pont de Nemours & Co., Inc., which opened a nylon intermediate plant here in 1946 when ethylene row was but a prairie and petrochemicals were just coming into their own. Du Pont continued to grow with the addition of a methanol plant and, more recently, polyethylene production.

No exact estimate on the company's investment here is available, but Du Pont has announced it spent more than



THIS IS AN ARTIST'S drawing of the Spencer Chemical Co. petrochemical plant on "ethylene row."

CONSTRUCTION CREWS are expected to complete the $14,000,000 Spencer plant by next spring.

half a billion dollars on its petrochemical plants here and at Victoria and La Porte. The Orange plant is the largest of the three.

Then two . . . Allied Chemical & Dye Corp.'s Nitrogen Division followed Du Pont. The division built an ethylene glycol-ethylene oxide plant and placed it on stream early this year. At the dedicatory ceremonies in May, Hugo Reimer, president, announced the plant will be expanded to produce ethanolamines *(The Oil and Gas Journal, May 31, page 49)*. The expansion is expected to be completed this year.

And three . . . The $14 million Spencer plant will produce 150,000 lb. of polyethylene daily. Formal groundbreaking ceremonies were held in July 1953, with much of the engineering and construction work started later.

Spencer will use the high-pressure I.C.I. process for production of its polymer and will be one of the eight producers which will give the Gulf Coast 80 per cent of the nation's producing capacity of this versatile product.

Maybe four . . . The next plant in the row may be a Goodrich-Gulf Chemical Co. petrochemical plant. The proposed facility would produce several end products. Current reports are that the company is delaying a final decision on whether to build the plant until the Government makes disposition of its butadiene plants and other synthetic rubber facilities. However, if the Goodrich-Gulf plant is constructed, it also will use feed stock from the Gulf ethylene pipeline.

The Government's Rubber Producing Facilities Disposal Commission currently is studying bids received on the rubber works *(The Oil and Gas Journal, June 7, page 63)*.

The ethylene pipeline, which extends to the Houston-Texas City area, remains unique not only in operations, but also in the impact it has had on this area. With the exception of Du Pont, which has some ethylene manufacturing facilities, the pipeline is set up to supply all of the ethylene requirements of Spencer, Allied, and Goodrich-Gulf, in addition to providing some gas for Du Pont.

The petrochemical feeder line has two principal arms. One runs about 32 miles northeastwardly from Gulf's huge Port Arthur refinery to Orange's ethylene row. The other arm stretches west and slightly north to Houston. This arm is about 76 miles long. From Houston, it drops south 40 miles to Texas City.

Coupled with the supply of raw material has been the ample water supply furnished by the Sabine River. The Sabine River Water Authority has been established to handle distribution of the water. The authority reports the major portion of the river's water is not being used for either industrial or agricultural purposes.

Thus, the Orange area shines as the newest satellite in the Gulf Coast petrochemical galaxy. Its enthusiastic boosters see no limit to the potentialities of this newest of the region's petrochemical centers.

Deep Test Spudded

Tide Water drilling Venice dome wildcat to 17,000 ft.

NEW ORLEANS.—Tide Water Associated Oil Co. has spudded what is expected to be the deepest test ever drilled on Venice dome in Plaquemines Parish.

The E. A. Manhattan, a semiwildcat on the west flank of the dome proper, is projected to 17,000 ft. and will be watched with interest because it will provide information regarding possible new pay zones below the present producing strata.

The deepest well previously drilled in the field was Tide Water A-24, drilled to 15,522 ft. on the same flank and plugged back to 13,700 ft. for production. There are multiple Miocene sands productive in the piercement-type salt dome field.

Tide Water operates Venice field and has 102 producing wells on 1,200 acres with a total production of 6,200 bbl. daily. The company has an undivided half interest in 1,500 acres in the area with Gulf Oil Corp. and Humble Oil & Refining Co. sharing the other half equally.

Tide Water opened the field, 85 miles south of New Orleans, in 1937. It has a current daily allowable to 14,563 bbl. The company has dredged a circular canal around the dome and digs slips to each drilling location. Rigs, supplies and personnel are moved to the field by water.

Pipeline Break Is Freak

HOUSTON.—There was frost on the ground and ice in the drainage ditches along the Almeda-Genoa road last week, although the temperature was in the upper 90's.

A break in a 4-in. line carrying isobutane between the Sinclair Rubber, Inc., plant and Pan American Refining Co. in Texas City was responsible. The expanding and cooling isobutane froze water in the ditches and threw an icy spray into the air.

The break was caused by workers digging a ditch for a new Houston Natural Gas Co. line.

SOUTHWEST

Panhandle Strike

High-gravity flow is best Texas Panhandle recovery

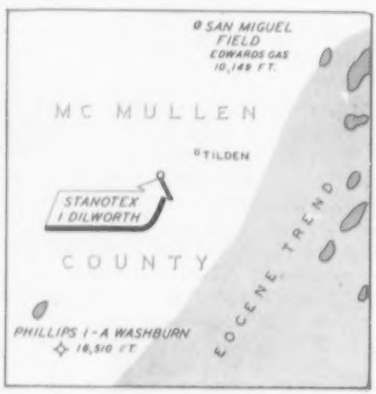
AMARILLO.—The Texas Panhandle has a major oil discovery in the deep portion of the Anadarko basin area of north-central Gray County.

Phillips Petroleum Co. 1 Delp, Section 110, Block M-2, BS&F Survey, 15 miles northeast of Pampa, flowed 43°-gravity sweet oil from the Pennsylvanian granite wash at a daily rate of 3,720 bbl. through small chokes in two successive tests in the section 9,548-65 ft. The well is still in the granite wash formation at a total depth of 9,565 ft. This is one of the best recoveries on any test run in a Panhandle well.

The well also produced gas at a daily rate of 3,200 M.c.f. This wildcat discovery had previously flowed gas at a daily rate of 6,600 M.c.f. through a 20-ft. section at about 9,400 ft.

Another wildcat . . . Another wildcat well now being completed by Phillips and an associate 6 miles west of the 1 Delp had a good show of oil and gas in the granite wash at 8,300 ft. This well, the 1 Jackson, is on a 16,500-acre block immediately adjacent to the 22,000-acre block on which the 1 Delp was drilled. The 1 Jackson has now been drilled to a depth of 10,450 ft. and pipe has been set for production tests.

In 1952 Phillips opened a granite wash gas-distillate pool, 4 miles northwest of the 1 Delp at the 1 Hobart Ranch (see page 211).



Eocene Test Staked

Stanotex plans wildcat to McMullen County Midway

TILDEN, Tex. — Standard Oil Co. of Texas has staked location for one of the few wildcats ever drilled to the Midway (lower Eocene) in the McMullen County area of the Rio Grande embayment.

The 13,500-ft. Midway test will be drilled at 1 Dilworth, on a 774.2-acre lease in the Hugh Frazier Survey 23, Abstract 193, 4½ miles southwest of here. The deepest test drilled in the area was completed dry in 1952 by Phillips Petroleum Co. at 1-A Washburn. This wildcat went to 16,510 ft. into the Edwards.

In the past 2 years, a deeper Cretaceous and lower Eocene play has been under way in this area. Shallow San Miguel field got a 70,000 M.c.f. daily gas well from Edwards porosity at 10,149-82 ft. last year at Humble Oil & Refining Co. 1 Louis M. Gubbels.

Depth Record Set

Gulf's wildcat near Pecos drilling below 18,063 ft.

FORT WORTH.—A new Texas depth record was set last week by Gulf Oil Corp.'s 1 Preston G. Northrup 24 miles southeast of Pecos, Tex.

At latest report, the test was drilling at 18,090 ft. and making from 20 to 40 ft. of hole a day.

The old depth record for the state was set in 1951 by Superior Oil Co.'s 27 Minnie S. Welder, which was plugged at 17,966 ft. near Corpus Christi in San Patricio County.

The Gulf wildcat, located 1,980 ft. from the north and west lines of Section 33, Block 50, T-8, T&P Survey, is aiming for the Devonian formation, which the company expects to find at about 18,500 ft. The heavy-duty rig being used is reported capable of drilling to 22,000 ft. if the operators should decide to attempt penetration to pre-Cambrian rocks. Parker Drilling Co. holds the contract.

Drilling was resumed at the 1 Northrup last May at 16,696 ft. in beds believed to have been of Pennsylvanian age. Gulf had stopped drilling at this depth and moved the rig off location in May 1953.

Lube Test Developed

Shell engineers tell S.A.E. of new blotter experiments to determine when oil in crankcase should be discarded

LOS ANGELES.—When should you change oil?

That question, which sometimes baffles oil companies as well as the average motorist, may be answered by a "blotter test" developed by four engineers with Shell Oil Co.

The test, described at the annual West Coast meeting of the Society of Automotive Engineers, is a rapid method for determining whether the lubricating oil in a gasoline, diesel or gas engine has deteriorated to the extent it should be discarded.

When a drop of used oil is applied to a specially treated paper the resulting spot pattern indicates the amount of contamination and extent to which dispersion has been reduced. Color of the oil spot also shows the lubricant's alkalinity level.

The method, according to its developers, V. A. Gates, R. F. Bergstrom, T. S. Hodgson, and L. A. Wendt, offers a quick, reliable field test and its continuous use provides an easy means to spot engine malfunction which markedly affects used oil condition. Plugged air cleaners, faulty injectors, faulty carburetion, and coolant leaks have been detected by the new technique, they declared.

Detects engine trouble . . . When used as a routine part of engine preventive maintenance and servicing programs, the test will note progressive deterioration of the lubricant. A sudden increase in spot density would be the signal of some engine malfunction.

Contamination caused by water or antifreeze is readily detected by the oil spots or "chromatograms."

To establish the background necessary for proper interpretation of results, thousands of spot tests and complete laboratory tests of used-oil samples were performed, Shell engineers said. Nearly a decade's work was involved in perfecting the method to the point where more time-consuming laboratory analyses can be bypassed.

Viscosity decreases caused by fuel dilution cannot be measured by the new tests, the developers pointed out. However, simple viscosity comparators are available and can be used in the field for quick determinations.

Metallic contaminants from engine wear are not identified by this technique, either. Spectrographic or chemical analyses are necessary for their identification and measurement.

Cylinder wear studies . . . Another trio of engineers told S.A.E. delegates that an oil's viscosity is an important criterion in judging its ability to eliminate cylinder wear.

In a jointly-prepared paper, H. V. Nutt of the U. S. Naval Engineering Experiment Station, E. W. Landen of Caterpillar Tractor Co., and J. A. Edgar of Shell Oil Co., stated that low oil volatility is essential to adequate lubrication of diesel cylinders. Low volatility, they noted, assures that a viscous film will survive the flash evaporation from the cylinder with each power stroke and thus prevent contact wear.

Contact wear is most prevalent, they added, when engine loads are high and surfaces hot, conditions which minimize the thickness of the film of lubricant. Oil's viscosity at high temperature, they said, is "an imperfect indicator of ability to prevent contact wear, whereas volatility can be a reasonably good guide."

Gas Line Capacity Boosted

LOS ANGELES.—Capacity of the "biggest inch" pipeline from West Texas to southern California was increased 150,000 M.c.f. when three new compressors went into operation at the Blythe, Calif., station in mid-August.

Some 73 miles of 30-in. loops along the 215-mile stretch from the Colorado River to Los Angeles were added last

Big Model IV Cracker Unveiled

LOS ANGELES.—The largest Model IV fluid catalytic cracker ever constructed—a 40,000-bbl. unit—was dedicated last week at Standard Oil Co. of California's El Segundo refinery.

The $20,000,000 unit will introduce cat cracking to the refinery and will boost the refinery cracking capacity from 77,000 bbl. daily to 117,000 bbl. daily. The previous cracking capacity resulted from thermal cracking units.

Dedication of the big cracking unit completes a large cracking expansion program that also included construction of a 52,000-bbl. residium stripper that will supply feed stock for the new cat cracker.

In conjunction with the cat cracker, a sulfur recovery plant also has been added to the refinery for the production of sulfuric acid.

T. S. Petersen, company president, said the sulfur-recovery plant brings the company's total outlay for control of emissions at El Segundo to more than $6,000,000 since 1926.

fall to make possible the increased capacity.

Addition of the three Clark compressors, each rated at 1,760 hp., stepped up daily capacity to 705,000 M.c.f., all of which goes to the line's joint owners, Southern California and Southern Counties gas companies. The new units, added at a cost of $1,500,000, including an Ingersoll-Rand generator, brought the station's installed horsepower up to 25,280.

The added capacity is almost equal to the line's 175,000 M.c.f. daily capacity when it was placed in operation in November 1947. It brought to $42,000,000 the investment the two companies now have in their portion of the Texas-California carrier.

Deep Tests Watched

Superior may be heading toward new depth record

LOS ANGELES.—Three deep exploratory tests, two in San Joaquin Valley and the other off the coast of Seal Beach in San Pedro Bay, were being watched with keen interest by California oil operators last week.

Monterey Oil Co. 3 State, being drilled from a man-made island 1½ miles from shore, was nearing the 10,000-ft. mark. Since this was about 2,000 ft. below the anticipated depth, observers were wondering if the no-dope hole, started as a vertical test, had become a slant hole. Monterey, as operator on the state lease jointly held with The Texas Co., has released nothing on results. Drill pipe was changed from 4½-in. to 3½-in. last week when regular depth capacity of the rig was reached.

In the Paloma field southwest of Bakersfield, Ohio Oil Co. was testing a possible productive zone at 16,500-16,700 ft. in the world's deepest well, which was spudded in 1951 and bottomed at 21,482 ft. The interval being tested is believed to be the most promising zone encountered below the field's regular 10,000-ft. pay. Testing was delayed for weeks while several casing leaks were cemented.

Going deeper . . . About 25 miles north, Superior Oil Co. was nearing the 15,000-ft. mark at a wildcat near Shafter. Aside from the Ohio test, which has been plugged back to 17,164 ft., Superior 73-17 Russell was California's deepest drilling well. With 13-in. casing set at 1,505 ft., there was almost 13,500 ft. of 9⅝-in. open hole in the well.

The wildcat is being drilled with a big company-owned steam rig capable of drilling to depths below 20,000 ft. When spudded last April it was scheduled as a 4,500-ft. test. The big rig was moved in when the well proved unsuccessful at shallow depths. This action, plus Superior's record for drilling deep wells, has led to speculation that the test might be headed for a new world's depth record.

Third Nevada Test Staked

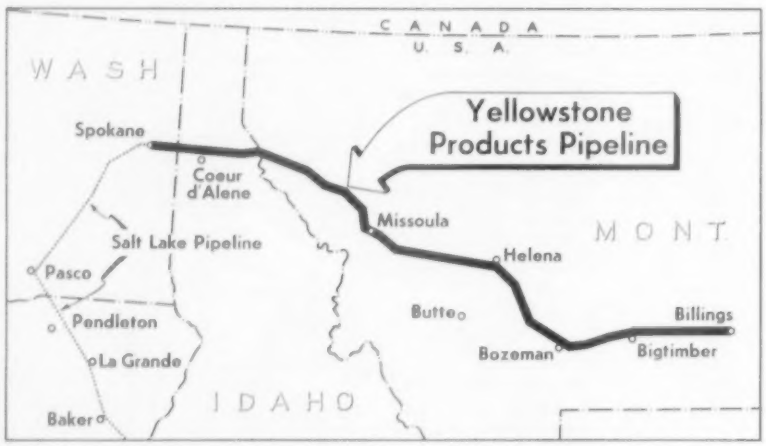
ELY, Nev.—Shell Oil Co. has staked location for its third Nevada well, 9 miles southwest of the company's Nevada discovery, 1 Eagle Springs.

The second well, 3 Eagle Springs, 65 miles southwest of here, was abandoned at 6,038 ft. after only a slight show was encountered at 2,250 ft. The operator cored 19 ft.

Shell spokesmen say the third well, 2 Eagle Springs, is "a continuation of the exploratory program."

Shell's first well sparked a Nevada exploration program that now has 18 geophysical crews operating in the state. Ten are seismic crews, seven are gravity, and one is a magnetometer operation. Among companies active in the state are Carter Oil Co., Gulf Oil Corp., Ohio Oil Co., Shell, Standard Oil Co. of California, and Richfield Oil Corp.

ROCKY MOUNTAIN



Products Line Finished

Big Yellowstone system provides new outlet in Northwest for Carter and Continental refineries at Billings, Mont.

BILLINGS.—Last link in the 540-mile Yellowstone products pipeline between Billings, Mont., and Spokane, Wash., has been completed and first shipment of diesel fuel has reached terminals at Bozeman and Helena.

Initial flow of products through the 10-in., $20,000,000 system is scheduled to reach terminals at Missoula, Mont., and Spokane the first week in September. When the first shipment of 18,500 bbl. of diesel fuel went into the line at Billings July 31, a 5-mile gap remained to be closed near Thompson Falls, Mont. *(The Oil and Gas Journal, August 9, page 74).*

The line, with an initial capacity of 30,000 bbl. daily, will replace tank cars and trucks in transporting products to Northwest markets from Continental Oil Co., and Carter Oil Co. refineries at Billings.

Market expansion seen . . . Carter and Continental plan to expand their markets considerably in Montana and eastern Washington as result of the line. It is expected to reduce sharply the cost of moving their products into the area.

W. L. Kygar, vice president and general manager of Yellowstone Pipe Line Co., said plans call for transmitting about 20,000 bbl. of products daily through the new system during early phases of its operation. Kygar also is president of Continental Pipe Line Co.

Rough terrain . . . Winding through Rocky Mountain passes, some of which are more than a mile high, the Yellowstone line presented unusually difficult construction problems. Although work lagged during the harsh winter, the

line was built in about 10 months and was completed a month ahead of schedule.

Ownership of Yellowstone is divided among Continental Oil Co., Interstate Oil Pipeline Co., Union Oil Co., and the H. Earl Clack interests of Spokane and Havre, Mont.

New president of Yellowstone is George A. Wilson, who also is president of Interstate *(The Oil and Gas Journal, August 16, page 211)*.

Second outlet . . . The big Yellowstone system is the second major products line into the Spokane area. Phillips Petroleum Co. now moves products there from its Woods Cross, Utah, refinery through the Salt Lake Pipe Line Co. system.

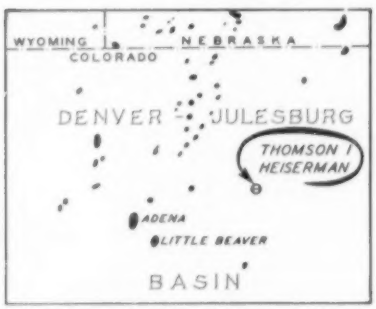
The Salt Lake line extends from Salt Lake City, through Idaho and Oregon, to Spokane. The last leg of the system, an 8-in. line from Pasco, Wash., to the Spokane area, was completed last fall.

Wildcat Tests Gas

Well on basin's east side, 20 miles from production

DENVER.—A rank wildcat about 20 miles from nearest production in the Denver-Julesburg basin has recovered gas at the rate of 2,500 M.c.f. per day on test of the "D" (Cretaceous) sand.

The remote prospect is J. M. Thomson 1 Heiserman, SE SE SW 25-3n-



50w, in eastern Washington County, Colorado. Test was of the 3,958-93 ft. zone. This is the first substantial encouragement thus far toward the east side of the basin and south of Sedgwick County. The wildcat is located in an area of the basin where little drilling has been done previously.

Crude Line Planned

CHEYENNE.—Cheyenne Valley Pipe Line Co. is preparing to construct a 58-mile, 10-in. crude oil line from Lance Creek to Fort Laramie, Wyo.

H. O. English of Casper and Maurice Yates of Salt Lake City, operators of the company, have filed an application for the $1,838,241 line with the Wyoming Public Service Commission and have asked for a hearing on September 27.

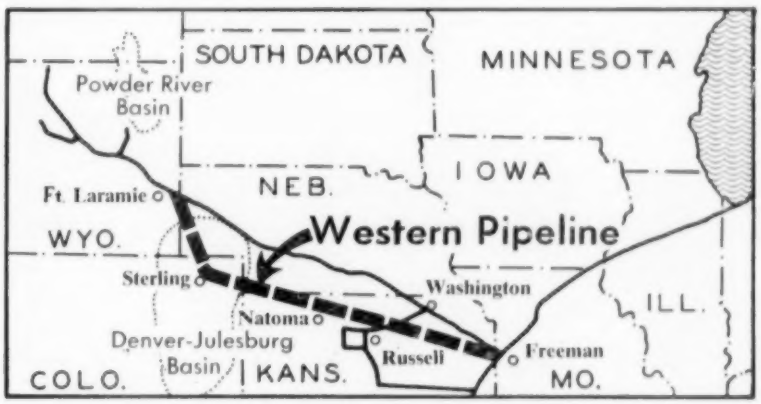
The proposed line would transport crude from Lance Creek pump station of Plains Pipe Line Co. to Fort Laramie where it would connect with Platte Pipe Line Co. The facilities will include a pump station and four 25,000 bbl. storage tanks at each terminal.

Tioga Spacing Ordered

BISMARCK, N. D.—Temporary 80-acre spacing for Tioga field has been approved by the North Dakota Industrial Commission effective September 1.

The commission ordered the spacing for a 14-month period after Amerada Petroleum Corp., chief operator in the field, presented evidence that one well would drain more than 80 acres and asked for the wide spacing pattern.

Landowner groups seeking a 40-acre spacing told the commission late last month they would not oppose a temporary 80-acre spacing order.



New Rocky Mountain . . .
. . . Crude Line Planned

FORT LARAMIE, Wyo. — Service Pipe Line Co. will more than double its capacity east of here in a move to better serve the fast-growing Rocky Mountain oil area.

A 630-mile crude line varying in diameter from 20 to 24 in. is planned from Fort Laramie to Freeman, Mo. A new company, Western Pipe Line Co., has been organized as a subsidiary of Service to build and operate the new common carrier.

Several spreads are expected to be used in the building the line since it is scheduled for operation by the end of the year. It would take five spreads laying more than a mile a day to complete the line by January 1. Construction contracts have not been awarded, but a Service spokesman said work will begin "very shortly."

The new line will have an initial capacity of 160,000 bbl. daily compared to the capacity of a present Fort Laramie-Freeman line of 60,000 bbl. daily. The line will be designed to handle 200,000 bbl. daily.

Source of crude . . . The proposed carrier will carry crude from the Denver-Julesberg and Powder River basins. New construction will not touch Powder River, but will pass through the northeast section of the Denver-Julesberg basin.

The new line will connect at Freeman with Service's 20-in. line to Whiting, Ind., where Standard Oil Co. (Ind.) has a 200,000-bbl. refinery. Service is a Standard of Indiana subsidiary.

Line to be replaced . . . The Western line will replace between 550 and 700 miles of line presently used by Service. This includes the 545-mile, 12 and 16-in. line from Fort Laramie to Freeman plus a portion of the Western Kansas section of the Service system. A spur of the Fort Laramie-Freeman line runs from Washington southeast to near Russell, Kans. Service officials decline to say what disposition will be made of the Fort Laramie-Freeman line.

The Fort Laramie - Sterling, Colo., portion of the new line will be 20-in. in diameter. From Sterling to Natoma, Kans., the line will be 22-in. and will jump to 24-in. at Katoma.

Geological Survey Looks to Sea

- **Agency prepares for offshore oil boom which may bring greater revenue than leases on all other public lands**
- **Government watchdog to assume burden of enforcing conservation rules on outer Continental Shelf leases**

Bertram F. Linz

WASHINGTON. — The U. S. Geological Survey, celebrating its seventy-fifth anniversary this year, is preparing for an offshore oil boom which is expected to bring the Government considerably more money than is derived from oil and gas leases on all other public lands.

Leasing of submerged lands on the outer Continental Shelf, scheduled to start this fall, will add tremendously to the responsibility of the Geological Survey and other agencies within the Department of Interior.

The Geological Survey, which directs the operations of lessees on the public domain, now has the added burden of supervising development on the Continental Shelf beyond the state boundaries.

Other major responsibilities of the survey, all of importance to the oil and gas industry, include the determination of geologic conditions and appraisal of mineral resources of the United States; study of occurrence, distribution, quality, and quantity of available supplies of water; and preparation of topographic maps.

Prepares for new task . . . In preparation for its important offshore assignment the Geological Survey recently opened a new Gulf Coast regional office at New Orleans. It is the agency's first office devoted specifically to tidelands operations.

Ever since it was founded in 1879 the survey has been engaged in geologic investigations providing basic data used in the development of the nation's supplies of petroleum and natural gas.

Increasing dependence upon oil and gas has required greater efforts to get the fundamental geologic data valuable in determining areas favorable for their occurrence. But work in fields unrelated to petroleum also is of value in defining areas with little prospect of producing oil or gas in commercial quantities.

Concentrates on petroleum . . . Because of the greatly increased demand for petroleum products in recent years and the intensified search for new deposits, the survey is now applying more of its resources to petroleum geology than ever before.

Results of this work are promptly made available to the industry. Since 1943, when it began to step up its efforts, the survey has published 194 maps and charts, of which nearly 250,000 copies have been distributed, and more than 100 additional reports have been made available through technical and industry journals or state agencies.

The survey is currently staffed by 71 geologists engaged in petroleum and natural gas investigations for which ap-

proximately $900,000 was appropriated for the last fiscal year. Its activities extend over 22 states and are conducted through field offices scattered through the nation's oil-producing areas.

As a part of its investigations for possible additional sources for petroleum the survey also is actively engaged in the detailed mapping of oil shale deposits of the United States. Because of the potential importance of this large resource, data are being obtained on the quality and availability of oil shale for processing as a possible source of liquid petroleum products. Field studies are being conducted to define the location, thickness, extent, and probable yield of the rich deposits.

Large areas surveyed . . . Geologic studies also have been made of several of the more important bituminous rocks in the country. Areas in Utah, California, and Texas, which show a total potential reserve of 2,274,100,000 bbl. of heavy oil, have been mapped in detail.

The geologic division has completed aeromagnetic surveys of large areas including all of Indiana, the Big Horn basin of Wyoming, 10,000 sq. miles of the Gulf of Mexico off the coast of Texas and Louisiana, 1,800 sq. miles in Central Pennsylvania, 6,000 sq. miles in New Mexico, about 36,000 sq. miles on the north slope of Alaska, including about three-fourths of the Naval Petroleum Reserve, and several traverses across the Continental Shelf in the vicinity of Los Angeles, Galveston, and Bermuda. The results of these surveys are being made available through publication and open file reports as rapidly as compilations can be completed.

Conservation gains importance . . . With the opening to development of the outer Continental Shelf, the work of the survey's conservation division has become of greater importance largely because of the impressive magnitude of the submerged oil and gas resources. In general, the same conservation procedures will be followed as on the public lands.

The conservation division is responsible both for the examination and classification of the public lands with respect to mineral resources, a prerequisite to the granting of leases by the Bureau of Land Management, and for enforcement of the mineral leasing laws. Leasing laws govern private development and producing operations on leases on the public domain, Indian lands, certain Naval Petroleum Reserves, some of the acquired lands, and now the Continental Shelf.

Currently, the division is supervising more than 100,000 leases in the United States and Alaska. These leases are producing oil and gas valued at $305,000,000 a year and returning royalties to the Government of more than $36,000,000. It also is engaged in validating as federal leases some 400 leases in the outer Continental Shelf originally granted by the states of Texas and Louisiana.

Works with other agencies . . . In classifying public lands the survey is called upon to provide other agencies of the Interior Department with technical facts required in the handling of a continuous flow of applications seeking the use of federal lands for a great variety of purposes. The survey also is called upon to obtain by field investigation, where necessary, the technical data required, and to examine and classify the vast public-land areas in the West that have been withdrawn by executive order for appraisal of their mineral values and water-power and water-storage possibilities.

The duties involved in oil and gas supervision include the advance approval of development plans and operating procedures; the periodic inspection of leased properties to assure orderly and efficient development of oil and gas deposits; and the maintenance of proper records of production. The agency also is responsible for enforcement of federal regulations, the accumulation and correlation of stratigraphic, geologic, production, and graphic records, the study and development of improved production techniques applicable to any given field, the analyses of oils, gases, waters, cores, etc., and the determination and collection of the royalty liability of each producer.

Housing problem . . . Although the Geological Survey has district offices in nearly 20 oil centers, its greatest housing problem is right in Washington. It is scattered all over the capital, in some 16 locations.

Agency officials hope to solve this problem. A committee appointed by Secretary McKay to study means of improving the agency has recommended construction of a headquarters building on a lease-purchase agreement. Under this proposal, a building would be constructed by private interests and sold to the survey under a monthly payment plan with rentals credited against the purchase price.

Who's Who and Where in USGS

WASHINGTON OFFICE

Address: Department of the Interior or U. S. Geological Survey, Washington 25, D. C.

Secretary of Interior: Douglas McKay.

Director, U. S. Geological Survey: William E. Wrather.

Assistant Director: Thomas B. Nolan.

Administrative Geologist: Arthur A. Baker.

Conservation Division: Harold J. Duncan, chief.

Geologic Division: Wilmot H. Bradley, chief geologist.

Topographic Division: Gerald Fitzgerald, chief topographic engineer.

Water Resources Division: Charl G. Paulsen, chief hydraulic engineer.

REGIONAL OFFICES

Midcontinent Region: 239 Federal Building, Tulsa 1, Okla., William B. Kramer, regional geologist; J. R. Reeve, regional supervisor, oil and gas.

Northwestern Region: 305 Federal Building, Casper, Wyo.; J. R. Schwabrow, regional supervisor, oil and gas.

Southwestern Region: 332 Federal Building, Roswell, N. Mex., T. F. Stipp, regional geologist; J. A. Anderson, supervisor, oil and gas.

West Coast Region: 529 Post Office and Court House Building, Los Angeles 12, Calif.; J. C. Miller, regional geologist; Leroy G. Snow, regional supervisor, oil and gas.

Gulf Coast Region: 1503 Masonic Temple Building, New Orleans, La., E. W. Henderson, supervisor in charge.

FIELD OFFICES

West Coast Region:
Los Angeles, Calif. (regional, as above).
Bakersfield, Calif., 910 Baker St., Glenn W. Black, district engineer.
Taft, Calif., P. O. Box CC, G. T. Murray, deputy supervisor.

Northwestern Region:
Casper, Wyo. (regional), M. M. Travis, district geologist.
Billings, Mont., 315 Federal Building, F. A. Swenson, district geologist.
Denver, Colo., Denver Federal Center, Raymond C. Becker, geologist in charge.
Great Falls, Mont., 417 Electric Building, Charles E. Erdmann, regional geologist.
Midwest, Wyo., P. O. Box 428, C. N. Nickerson, district engineer.
Salt Lake City, Utah, 306 Federal Building, Willard C. Gere, district geologist.
Thermopolis, Wyo., 202 Federal Building, J. H. Hassheider, district engineer.

Midcontinent Region:
Tulsa, Okla. (regional, as above).
Holdenville, Okla., 5 Post Office Building, W. R. Cummings, district engineer.
Oklahoma City, Okla., 411 Federal Building, M. H. Soyster, deputy supervisor.
Shreveport, La., 501 Ockley Drive, N. Orvis Frederick, district engineer.

Southwestern Region:
Roswell, N. Mex. (regional, as above).
Artesia, N. Mex., 218 Ward Building, John A. Frost, deputy supervisor.
Hobbs, N. Mex., 1010 Broadway, Harry A. DuPont, engineer in charge.

Gulf Coast Region:
New Orleans, La. (regional, as above).

Iran Plans Revealed

Oil money to buy program of big public developments

REVENUE to be received by Iran over the next 5 years under the recently announced oil settlement is to be used to finance an ambitious public development program of land reclamation, increased agricultural and mineral production, and improvements in communications and transportation.

The prime minister, Fazollah Zahedi, said in Teheran that the program would be under the supervision of a five-man supreme planning council. He outlined a number of badly needed projects to improve the country's economy.

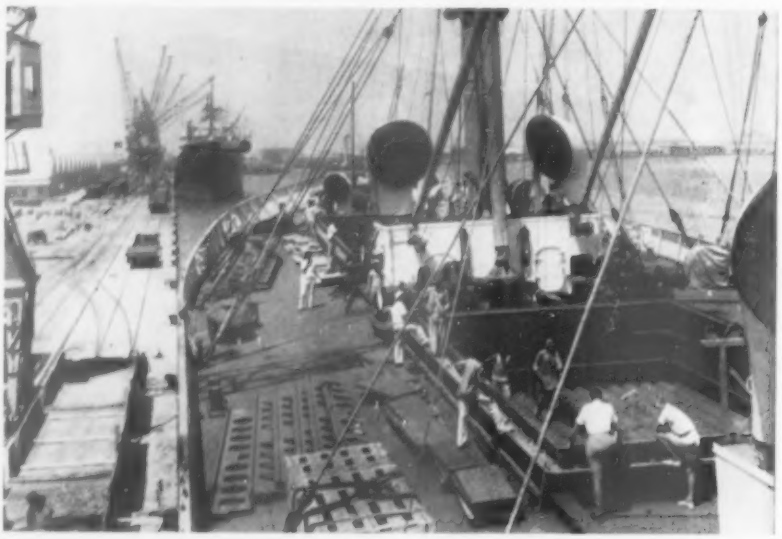
The oil settlement provides that Iran will receive some $420,000,000 over the next 3 years, and further large annual sums after that as production continues. In addition, the country is seeking further credits from the United States and from the International Bank for Reconstruction and Development to get the development program under way.

Shortly after the war, a far-reaching development plan was mapped for Iran by foreign consultants who studied the country's economy. For the last 3 years, Iran's financial situation has deteriorated with the shut-off of oil income.

Parliament next . . . General Zahedi's remarks were made as the government prepared to submit the agreement with the eight-company international consortium to the Parliament for ratification. Although the prime minister conceded some opposition, he said approval is certain. If ratification comes quickly, the consortium may be able to begin exporting crude oil around October 1.

Howard Page, a director of Standard Oil Co. (N.J.) and chief consortium negotiator, returned last week to Teheran where legal experts representing the oil companies and the Iranian Government are drafting the final documents on the agreement.

Page estimated that that the agreement will be signed in about 3 weeks. He said that both Iran and the oil consortium would have to accept or reject the agreement without amending its terms. Asked about the possibility of delay in Parliament, Page said: "They will have to take it or leave it. We cannot go on negotiating forever."



Pipe For Sui Gas Line Arrives

PIPE has begun arriving at Karachi, Pakistan, for the construction of the first important gas-transmission line to be built in Southeast Asia.

The 16-in. pipe for the 350-mile line from Sui field to Karachi is being supplied by Stewart & Lloyds in Britain. The first shipment of 2,663 tons was unloaded recently in Karachi. The entire line will require about 42,000 tons of pipe.

The contractors, Pakistan Constructors, are now bringing in equipment for the project. Two temporary camps, one at Setharja and one a Bandhi, have been established in preparation for the beginning of construction in September.

The line is due for completion in May 1955 with the first movement of gas to industrial consumers the following August. Sui field was discovered in 1952 by Pakistan Petroleum, Ltd., (Burmah Oil Co., Ltd.) as a part of its oil exploration program in the country. The pipeline project is being carried out by Sui Gas Transmission Co., Ltd., in which the equity capital is held by Burmah Oil Co., Ltd., Commonwealth Development Finance Co., Pakistan Industrial Development Corp., and public investors in Pakistan. Controlling interest is held by Pakistan.

Italians Unhappy

Milan spokesman against state-controlled industry

DISSATISFACTION with results of state-controlled petroleum exploration and development is being expressed officially in Italy.

A report emphasizing the need for investment of foreign capital in the oil and gas industries was submitted recently to the industry committee of the Italian parliament by Avvocato Dosi who represents industrial Milan.

His views were supported in parliament where another member declared that Italian capital is not sufficient for the development of Italy's mineral resources, and that the present policy excluding or discouraging foreign investments is leading to bankruptcy.

The committee, however, has not approved an overhaul of existing Italian legislation pending a study of Italy's present petroleum reserves.

Criticism of Italy's oil policy is said to result from the fact that the over-all government corporation, Ente Nazionale Idrocarburi, (ENI) has already absorbed large sums of money and it is not believed likely that much further capital for oil and gas development can be found in the Italian market.

The Genoa - Cortemaggiore natural-gas pipeline, which was scheduled to have been completed in October of last year, is still unfinished, and according to Italian sources, it probably will finally have only a limited capacity due to lack of adequate financing.

Tanker Slump to Last

Boost in tonnage outstrips increases in world demand

TANKER charter rates aren't apt to pull out of their current severe slump for some time to come.

The trouble with the tanker business is surplus tonnage. It is now estimated that more than 200 ships aggregating about 2,500,000 tons are lying idle in ports around the world.

Worse yet, the outlook is anything but encouraging. J. H. Kirby, of the Shell shipping organization in London, pointed out at a recent launching in Belfast, Northern Ireland, that continued unemployment of tankers can be expected unless world oil consumption picks up fast.

The unbalanced condition is primarily due to the fact that tanker tonnage is increasing by about 12 per cent annually while petroleum demand in the Free World is showing an annual gain of only about 4 per cent, Kirby said.

Tanker rates recently dropped to their lowest level in the last 5 years. One index showed rates for tankers operating on a dollar basis at 48.2 in May. This index is based on the old U. S. Maritime Commission scale of 100.

Low tanker rates mean low oil prices in importing and consuming countries because of the reduction of the freight component. A depressed tanker market also allows crude from the Middle East to widen its area of competitive advantage with other production, and pipe lines lose popularity in cases where alternative ocean transportation exists.

Older vessels hard hit . . . The older and more uneconomical vessels have been particularly hit by the current slump. There is still a demand for the larger and more efficient tankers which can carry oil at cheaper rates. Under these circumstances, the newer ships are driving the older ones out of circulation with increasing rapidity.

Since the end of the war, the economics of ocean transportation have favored construction of larger and larger tankers, and several of more than 40,000 tons have been launched in the United States and abroad during the last year. Per barrel carrying costs drop sharply in ships of this type, and a corresponding capacity in smaller, older tankers is thrown into competitive disadvantage.

An increasing number of the wartime T-2 type tankers of 15,000 tons are being laid up, and shipping sources report the "point of no return" is being reached in employment of these vessels. It has been suggested that unless there is an appreciable rise in the demand for tonnage, the only vessels which will be able to operate profitably are ships built since the end of the war and having a size of 18,000 tons or more.

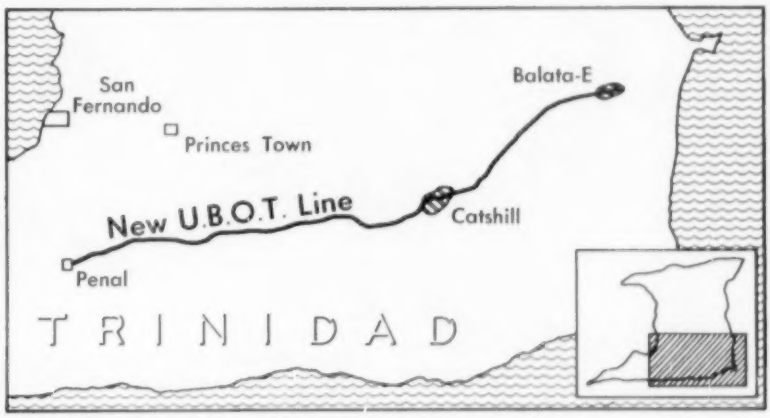
Independents hurt . . . Tanker operators most seriously affected by the depressed market are the so-called independent owners chartering their vessels on the spot market. This spot market is a fairly narrow segment of the entire tanker business, since approximately nine-tenths of world tanker tonnage is either owned by the oil companies or is independently owned and operated on long-term charter.

Owners of vessels affected by the present surplus are resorting to various expedients to keep their ships busy. One ship recently put into Montreal with a load of molasses. Other ships are carrying chemical and other liquid products. In Europe, a Swiss tanker owner took on a cargo of French wine and sold it to chemical firms in West Germany for use in synthetic rubber manufacture.

Pemex Plans New Refinery

Plans to construct a new 30,000 bbl. daily refinery at Guaymas, in the State of Sonora, have been announced by Antonio J. Bermudez, director general of Petroleos Mexicanos.

Guaymas is a northwestern Mexican port on the Gulf of California. Pemex officials said the refinery, Loma Lolita, would be undertaken in the immediate future. Crude oil will be supplied from Mexican fields, either by a new pipeline or by tanker shipments from Salina Cruz. Cost of the refinery was given as about $12,000,000.



Crude Line Finished

32-mile pipeline serves southern Trinidad fields

UNITED BRITISH OILFIELDS OF TRINIDAD, LTD. (Royal Dutch-Shell) has completed and placed in operation a new 32-mile pipeline carrying crude oil from two newly developed fields in southern Trinidad.

The 6 and 8-in. line extends across the southern part of the island from Balata-E field, a few miles west of Mayara on the east coast, to Penal in the west where it connects with the system leading into U.B.O.T.'s 30,000-bbl. daily refinery at Port Fortin. Cost of the line together with associated pumping facilities was about $600,000.

The two fields served by the new line represent the only success in an exploration program which U.B.O.T. began in 1933 on belief that Trinidad's oil producing section extended over the eastern side of the southern part of the island.

Success only moderate . . . By the end of 1951, the company had spent better than $3,500,000 on dry holes and other activities, and was prepared to attempt one more location. This well, 4 miles west of Mayara, was taken to 4,485 ft. and became a producer in the Oligocene Herrera sands. At Catshill, reasonably good results were obtained in developing shallower production.

In inaugurating the new line, Trinidad's acting governor, Maurice Dorman, pointed out that U.B.O.T. had spent the equivalent of around $10,000,000 during the last 21 years and that there was no assurance the new fields would be sufficiently productive to recover this money. The oil industry, he said, works in big figures but not always are the rewards commensurate with the risks. Unfortunately, he added, this applies to Trinidad.

Wildcat Staked

Eastern Australian venture to be spudded in 2 months

LUCKY STRIKE DRILLING CO., Tulsa, has staked its first wildcat location on the Cherwell Creek anticline on a 5,700-sq.-mile lease in Maryborough basin of Queensland near the eastern coast of Australia.

An 80-B rig that will drill the test is scheduled to be shipped from San Francisco about September 1 and arrive in Australia around September 20. The test is expected to be spudded about a month after the rig arrives.

Oil Drilling & Exploration, Ltd., Sydney, will drill the well. Lucky Strike is the largest stockholder in the drilling firm and Gene Goff, Lucky Strike president, is chairman of Oil Drilling & Exploration. Twenty per cent of Lucky Strike's concession is owned by Oil Drilling & Exploration.

The Lucky Strike wildcat location is between Maryborough and Bundaberg about 5 miles off a main highway running between the two towns.

The Lucky Strike concession is across the continent from Rough Range 1 well, a West Australian Petroleum Pty., Ltd., venture that was Australia's first apparent commercial oil production.

Hydroformer Work Begun

Construction work on a fluid hydroformer capable of charging 12,500 bbl. daily of naphtha has started at the Ras Tanura refinery of Arabian American Oil Co. in Saudi Arabia.

Engineering for the unit is being done in London by Lummus Co., Ltd., and the main vessel, the 235-ton reactor, is being fabricated in the Netherlands. The hydroformer is due for completion in July 1955, and its operations will be integrated with those of Ras Tanura's new catalytic polymerization plant and naphtha caustic-wash unit.

Ras Tanura ranks as the largest operating refinery in the Eastern Hemisphere with runs which have ranged up to 245,000 bbl. daily.

Honduras Passes Oil Law

A new comprehensive petroleum law has been enacted by the congress of the Central American republic of Honduras.

Except for a few general provisions, the legislation removes petroleum from the list of minerals covered by the 1935 mining code. The law establishes the state as the owner of all petroleum of any nature and fixes 25 per cent as the government's share of net profits from any oil production.

The Ministry of Agriculture is vested with the administration of the legislation which sets up the conditions under which concessions may be granted. Foreign governments or foreign government-controlled corporations are prohibited from becoming parties to concessions.

Honduras has no oil production at present.

Gulf Leaves Tunisia

Gulf Oil Corp. has abandoned its exploratory program in Tunisia, North Africa, after 5 years of work, five dry holes, and the expenditure of around $7,000,000.

Gulf operated in Tunisia through Soc. Nord Africaine des Petroles (S.N.A.P.) in which it held 65 per cent interest. The remaining interest was vested in SEREPT which is controlled by the French and Tunisian governments. S.N.A.P. held rights over five areas in Tunisia totalling about 11,300 square miles on which renewals were not asked.

The company's five wells ranged from 3,900 to 12,053 ft. The only shows were in the deepest, St. Juliette 1.

The other foreign company in Tunisia, Cie. Francaise des Petroles de Tunisie (65 per cent Royal Dutch-Shell and 35 per cent SEREPT) has asked extension of its exploration permits.

International Briefs

What is considered to be the world's largest ship specially designed for the transportation of bulk asphalt has been launched by a Hamburg, Germany shipyard for the Royal Dutch-Shell Group. The vessel is the Plagiola of 15,000 d.w. tons. Under present plans, it will be used to carry asphalt between the Netherlands West Indies and the East Coast of the United States. Special heating coils will raise the temperature of the asphalt to about 270°. A sister ship, Platidia, is to be launched in the next few months.

The French governcent - controlled company, Regie Autonome des Petroles, has been granted a permit for oil exploration covering an area of 1,930,800 hectares, or about 4,750,000 acres, in nine departments of eastern France.

Initial tests in Nahorkatiya 3, the new field of Assam Oil Co., Ltd., in Upper Assam, India, indicate another successful deep producer on a par with first two wells which are capable of about 500 bbl. daily each. Full production tests await completion of the new pipeline to the Digboi refinery. The company meanwhile has begun drilling Nahorkatiya 4 on the north bank of the Burhi Dihing River. The field will provide India's only domestic oil production aside from Digboi itself which was discovered in 1890.

American Overseas Petroleum, Ltd., (Caltex) and Soc. Nationale des Petroles du Languedoc Mediteraneen (66 per cent French Government) have organized a new joint subsidiary to carry out exploration of a new concession of some 7,800 sq. miles in Central France. The operating company, with a capital of 100 million francs ($290,000) is France-Outremer de Prospections et Explorations Petrolieres (Fropex). The concession agreement, yet to be embodied in a decree from the Ministry of Commerce and Industry, gives Caltex a 55 per cent participation in the exploratory stage but reduces this to 45 per cent if commercial production is obtained.

A 38,000-sq. mile section of Central British Guiana will be photo-mapped by Spartan Air Services, Ltd., Ottawa, under contract from the British Colonial Surveys Office, London. The work began early in August and is expected to continue about 3 months.

The negotiation of an exclusive 3-year concession for oil exploration in Nicaragua has been reported by Henry Haas, president of Cuban Oil Basins, Inc. In Havana, Cuba, Haas said an agreement signed with the Nicaraguan Government gave his company rights over the entire country with a one-eighth royalty on any commercial production. The company has the right to give up or assign any individual area.

American Overseas Petroleum, Ltd. (Caltex) has taken out seven exploratory concessions covering about 1,230,000 acres in the Philippines. The concessions which have been approved by the Philippine Agriculture and Natural Resources Department are for areas in Cagayan, Isabella, and Mountain Province of Luzon. Caltex will be the first foreign company to undertake exploration in the Philippines since passage of a comprehensive petroleum law about 5 years ago. There has been some activity by local companies.

it's a

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San Francisco, 4 ..... 1554—200 Bush St.
Seattle, 1 ..... 1325 Henry Bldg.
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Horton Steel Works Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
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Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo 275, Grupo 306, Rio de Janeiro, Brazil

Let's take a good, hard look at this

PREIGNITION PROBLEM

. . . and at the study being directed at its solution

by George Weber
Refining Editor

What to do about it... that is the question

OF the many subjects of current concern to petroleum technologists, preignition is attracting the most attention by a wide margin. Variously termed preignition, surface ignition, or deposit-induced ignition, the problem of abnormal combustion in high-compression-ratio engines first attracted wide interest only 2 years ago.

Since then, a session on preignition has almost become a "must" for program committees on technical petroleum and automotive associations. During the first half of this year alone, 21 technical papers were presented at four separate sessions devoted to that subject.

A cross-section of current reports on the subject in the form of extracts from seven selected papers of the past few months, is presented on the following pages. This abbreviated presentation admittedly lacks the full background and details necessary to a serious study of the problem. It is intended to highlight the progress of preignition studies for those whose interest in the problem is less than full time.

More work . . . Preignition will share in research budgets for some time to come. Its causes and measures necessary to alleviate or prevent its occurrence are not yet fully defined. Hence, in the absence of established tests for identifying and evaluating this phenomenon there exists an area of hearty disagreement on what preignition amounts to and what should be done about it.

From this controversy have emerged two camps: the additive faction and the companies which believe that higher octanes are the answer. Their opposing views have sparked the liveliest debate ever touched off in petroleum research.

This debate extends to technical sessions where papers have presented the positions taken by various companies. Two points of view from the leaders of each side are outlined in the conclusions drawn in two papers in Section 1, **The Additive-Octane Debate.**

Section 2, **New Light on Measurement,** consists of extracts from four papers on research directed toward better methods for observing and evaluating preignition. This field is showing particular progress at the present time.

Continuing studies of fundamental causes of preignition represent equally important contributions to eventual solution of the problem. Section 3, **Fundamental Causes of Preignition,** is an extract of a paper reporting on the ignition resistance of various fuels and components.

1. The Additive-Octane Debate

Yea . . . Jeffrey et al.[1] sum up the case for additives as follows:

We expect that the average motorist will quite easily observe that he has a much smoother operating vehicle when using a fuel containing an effective phosphorus-type additive due to the reduction or elimination of spark-plug fouling. If he is a careful observer, he will find that he is also obtaining more power and better fuel economy.

The effect of phosphorus-type additives on deposit-induced ignition or preignition will also be noticeable to the average motorist. The elimination of abnormal combustion cycles, whether they produce noise or not, will result in much smoother engine operation. The elimination of wild ping or erratic knock and the improved smoothness obtained are as important to the motorist as the beneficial effects on power and economy.

We believe that the deposit modifier approach has been demonstrated to be an effective solution to the pressing field problems of premature spark-plug fouling and preignition. Among the various types of chemical deposit modifiers which have been studied, several phosphorus compounds meet most of the required over-all performance requirements. TPC additive appears to meet them all.

Although the compound we are now using is very effective in alleviating these current problems, we are actively engaged in the development of improved materials. We can confidently expect that still more efficient additives will be available as they are required to permit the gasolines of the future to meet the requirements of automotive engines in the years to come.

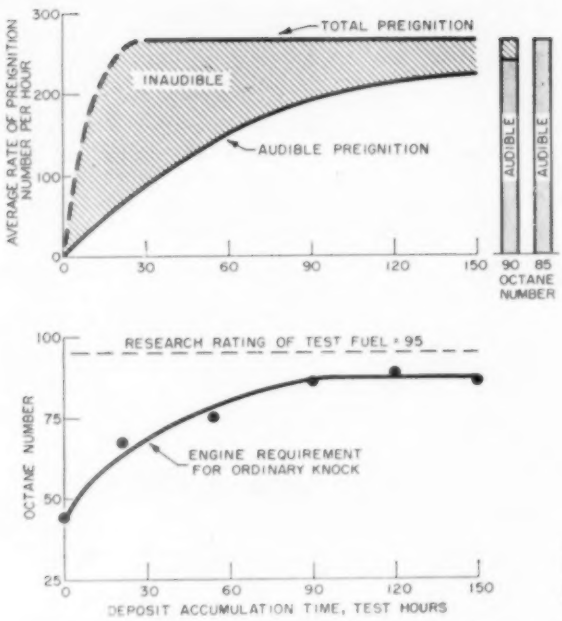
Nay . . . Fleming et al.,[2] in opposing additives present these conclusions drawn from work carried out at Esso Laboratories, Research Division, Standard Oil Development Co., Linden, N. J.:

1. Combustion-chamber deposits are harmful in that they cause an increase in the octane requirements of automotive engines.

2. Preignition and spark-plug fouling are not pressing problems in the field today.

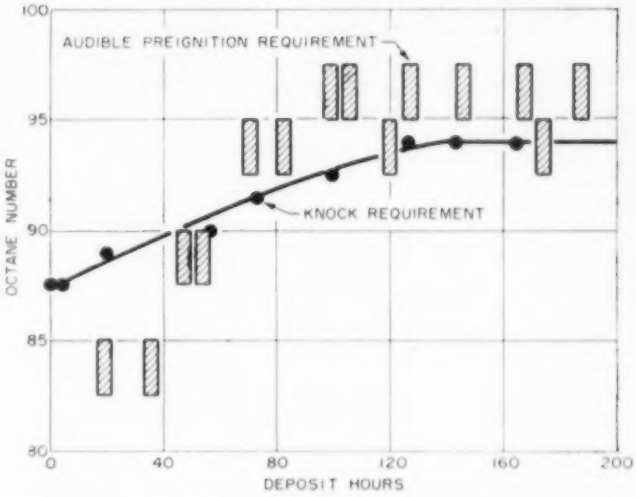
3. The soundest solution to the problems associated with combustion-chamber deposits is the use of high-quality fuels and lubricants with low deposit-forming tendencies.

4. The use of phosphorus additives in gasoline is not attractive on an over-all basis for the following reasons: (a) They reduce preignition tendencies but they cause marked increases in octane requirements. It is expected the latter will occur in future type, high compression ratio engines, as well as engines now on the road. (b) Phosphorus in gasoline also has an adverse effect on power, fuel economy, and valve life.



Single-Cylinder-Engine Evaluation

Fig. 1—Relation of deposit-accumulation time to rate of audible and inaudible preignition.



The solid circles represent knock requirements. The upper end of each crosshatched bar is the octane number which suppresses audible preignition, and the lower end the octane number which produces audible preignition.

Multicylinder-Engine Evaluation

Fig. 2—Relation of deposit-accumulation time to octane-number requirements to suppress preignition and ordinary knock.

2. New Light on Measurement

Preignition Problem

Hinkamp et al.[3] point out that the preignition problem exists today in some high-output passenger cars when they have been driven under low-speed conditions, as in metropolitan traffic. It is a limitation on further advances in engines to use fuel more efficiently.

Preignition occurs when some portion of the fuel-air charge in the engine cylinder is prematurely ignited by a hot surface. In passenger cars preignition is normally caused by particles of carbonaceous residue from fuel and oil which are made to glow by the catalytic action of metal salts.

The amount of preignition is dependent on fuel, oil, and operating conditions. Some preignition is audible, the proportion being dependent on fuel antiknock quality and on the time and place of ignition of the charge by deposits. The preignition problem can be reduced by the use of fuel of sufficiently high octane rating, and by modification of these properties of base gasoline and lubricating oils which contribute to carbonaceous residues. The problems can also be reduced by fuel and oil additives. Commercial fuel additives which reduce preignition also improve spark-plug life.

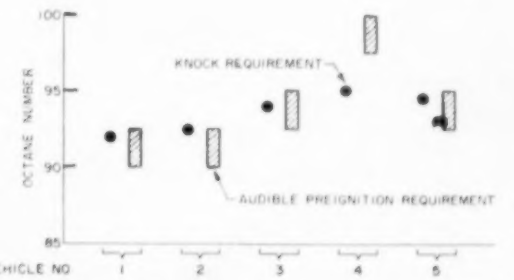
Three methods of evaluating preignition are described, and some results are given. The methods are: (1) single-cylinder engine evaluation; (2) multicylinder engine evaluation; and (3) road evaluation in passenger cars.

Methods of Evaluation

There are no standard methods for the measurement of preignition and for the evaluation of means for its control. A number of oil and automotive research groups are trying various methods, and have been discussing their value in technical-society meetings. At present it is not possible to determine how results obtained by one technique would have turned out if another technique had been used. The three methods described hereinafter are those used in the Ethyl Laboratories.

Single-cylinder engine evaluation . . . In this technique the rate of total preignition is measured and, with added equipment, the rate of audible preignition can be determined. In this technique measurement is made of the combined effect of the contributions of fuel and oil to harmful deposits, and the resistance of fuel to ignition by deposits.

Tests generally are run for 150 to 175 hours. The upper portion of Fig. 1 shows that the rate of total preignition becomes stabilized early in the test, but very little of this preignition produces audible sounds. In the later stages of deposit accumulation the average rate of total preignition remains the same, but a much larger portion of the preignition becomes audible. The curve showing the increase in audible preignition is similar to the curve in the lower portion of the figure which shows the increase in octane-number require-



The solid circles represent knock requirements. The upper end of each crosshatched bar is the octane number which suppresses audible preignition, and the lower end the octane number which produces audible preignition.

Vehicle Evaluation

Fig. 3—Octane-number requirements to suppress preignition and ordinary knock in five test vehicles.

Preignition Problem

ment for suppression of ordinary knock.

It thus appears that, as the engine requirement increases and approaches the octane number of the test fuel, the proportion of preignition which is audible increases in a similar manner, although the occurrence of total preignition remains the same. The bars at the right of the upper curve in Fig. 1 show that the portion of preignition which is audible increases to 100 per cent if fuels of lower octane number are used to rate the engine at the end of the test.

In this technique the engine normally is run with an L-head in order to simplify head removals. A valve-in-head cylinder was tested for preignition tendency, and it showed less total preignition than the L-head cylinder at the same compression ratio.

The L-head single cylinder is operated with the ignition timing set at the top dead center, although the maximum power ignition timing is 15° or 20° earlier. Operation with the timing thus retarded results in a considerable magnification of the effect of deposits on the increase in octane-number requirement for suppression of ordinary knock, and on the rate of preignition. This magnification appears desirable in a research tool.

Multicylinder engine evaluation . . . Full-scale engine evaluations are carried out with modern V-8 valve-in-head engines, operated on a moderately low-speed passenger-car cycling schedule, on dynamometer stands.

Each 150-hour test is started with clean combustion chambers, induction system, and crankcase. Periodic determinations are made to find the fuel octane numbers required to suppress preignition and ordinary knock. In tests so far conducted only audible preignition has been observed.

The technique permits measurement of the combined effect of the contributions of fuel and oil to harmful deposits, and the resistance of the fuel to audible preignition. Ratings are normally made with primary reference fuels, but essentially the same engine requirements in terms of research octane number are obtained when commercial fuels are used.

Results of a typical test are shown in Fig. 2, in which the fuel octane numbers required to suppress ordinary knock and audible preignition are plotted against hours of deposit accumulation. The solid circles represent observations of knock requirement, which was 87½ octane number with the engine clean, and which stabilized at 94 octane number at about 130 test hours. The crosshatched bars represent preignition requirements.

The lower end of the bar represents an octane number which gives audible preignition; the upper end an octane number which suppresses audible preignition. Thus, at about 40 hours, a fuel of 82½ octane number gave audible preignition, whereas a fuel of 85 octane number did not.

After 80 test hours, there were several observations of preignition with a fuel of 95 octane number, preignition being suppressed by 97½ octane number. This is a good example of the preignition requirement's exceeding the knock requirement. Fig. 2 also shows that preignition is much more erratic than ordinary knock, even under carefully controlled test conditions. The erratic behavior is probably due to a continuous change in the condition of the deposit surface.

Road evaluation . . . The road evaluation of preignition in passenger cars makes use of cars with modern V-8 valve-in-head engines. Cars are operated by professional drivers over a given course, and with maximum speed limited to 40 or 50 m.p.h. Deposits are accumulated for 6,000 miles, and then for 5 or more days daily observations are made of octane-number requirements to suppress ordinary knock and audible preignition.

The cars are driven at least 500 miles between ratings. In this technique measurements are made of the combined effect of the contributions of fuel and oil to harmful deposits, and the resistance of the fuel to audible preignition.

Fig. 3 shows results of typical road tests in five cars of the same make as the engine for which data are shown in Fig. 2. These data were obtained after equilibrium deposits had accumulated. All five vehicles had preignition requirements almost as high, or higher than, their knock requirements. Vehicle No. 4 had its preignition requirement (97½ to 100) well above its knock requirement (95).

Preignition in vehicles on the road is even more erratic than in multicylinder engines on dynamometers. For research purposes it is not necessary that the preignition requirement be above the knock requirement. Studies of fuel additives which suppress preignition can be carried out successfully when the reverse is true—by observing preignition with the spark retarded.

It has been known for some time that octane-number requirements for the suppression of ordinary knock vary with atmospheric pressure, temperature, and humidity. The effects are large in some cars, small in others. Data recently obtained indicate that octane-number requirements for the suppression of audible preignition of some cars are affected to a large degree by changes in air temperature and humidity.

To avoid this complication, all observations of knock and preignition, in cars operated at Detroit, are made on a chassis dynamometer, where fixed temperature and humidity of the air are maintained.

In cases of severe preignition a car may accelerate smoothly with the ignition turned off. One car with a compression ratio higher than standard (8.8:1 vs. 7.5:1) runs smoothly on a level road at constant low speed, without ordinary ignition.

New Engine Analyzer

Martin and Gaffey[4] have reported that years of laboratory experience in engine testing indicated the need for instrumentation to quickly and accurately ascertain engine operating parameters to aid in combustion studies.

Work was initiated on such a project several years ago, which resulted in the development of a new engine analyzer. The instrument was developed as a research laboratory tool but its use as a field service instrument is now being explored.

In the laboratory, basic patterns were developed and identified. The instrument was found to be extremely useful in establishing test specifications and resulted in improved reproducibility of many operating techniques.

In detonation studies the instrument proved to be an excellent tool, particularly in cases where individual cylinders were responsible for knock.

The analyzer, when used in a circuit with the spark plug as a thermionic gap, is a very reliable tool for the measurement of preignition, and its use has aided in the development of fuels to minimize this combustion phenomena.

Principles of operation . . . The cathode-ray engine analyzer is basically an oscilloscope, automatically synchronized to engine-crankshaft position, and as such, has all the beneficial characteristics of this modern electronic equipment for detecting normal and abnormal engine operation. As in all oscillographic work, the useful information available to the observer is in the form of visual dynamic patterns appearing upon the face of the cathode-ray picture tube. Interpretations are based on observations of the behavior of the pattern with reference to known, or normal patterns.

With the advanced stage of the art of transducer design, and the inherent

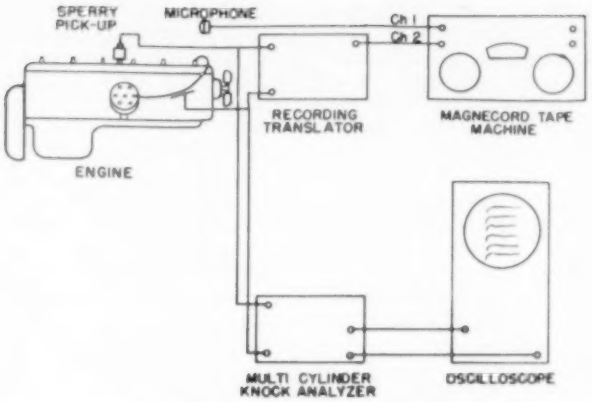


Fig. 4—Diagram for obtaining the record.

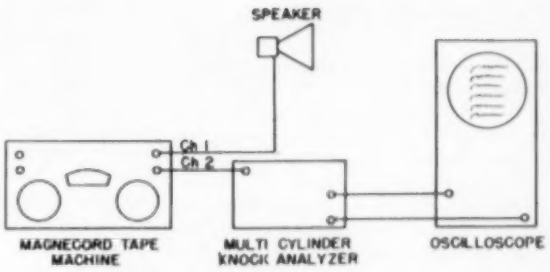


Fig. 5—Diagram for obtaining the playback.

operating parameters of internal-combustion engines, the oscillographic technique for engine-analysis work is particularly appropriate. By means of any of the various types of transducers available, wherein almost any engine performance factor may be converted to an equivalent electrical voltage or current signal, many engine operating characteristics become readily apparent for study. Since the several functions of the internal-combustion engine are repetitious, and are too fast for either mechanical or direct observations, testing by means of oscillography is a natural and useful development.

The instrument designer, in adapting this type of analysis to engine-test work, is faced with several means of approach to the problem of synchronization of pattern to engine-crankshaft position. Characteristically, the oscilloscope is an electronic device for drawing a graph, usually in terms of Cartesian coordinates. For engine analysis work, it is convenient to plot the variable function to be studied as the "Y" or vertical variable, and crankshaft position as the "X" or horizontal variable.

The designer has no problem so far as the vertical variable is concerned, since the transducer supplies the electrical voltage equivalent to the parameter being studied. In the horizontal dimension, however, several problems do exist. By known electronic techniques, it is possible to initiate the horizontal motion of the plot at any particular point in a cycle, and to cause this plot to move linearly with time. The question then arises as to what time, or better to what crank angle the horizontal dimension of the graph should be made to equal. Two choices appear to be reasonable: (1) a time of sweep equal to time between firing of consecutive cylinders, or (2) a time of sweep equal to the time required to fire all cylinders.

In the former choice, the resulting plot spreads the pattern across the available space on the picture tube in such a manner that maximum horizontal separation is obtained. However, the oscilloscope automatically starts the next plot on the left edge of the picture tube in the same place as before, with the resulting extreme disadvantages that all subsequent plots would be superimposed on the front. Such a pattern would entirely preclude the possibility of identifying individual cylinder patterns.

If choice (2) above were elected by the instrument designer, the pattern for each cylinder would follow one another in parade fashion, producing one pattern horizontally that actually was a succession of individual cylinder patterns. In such a display, cylinders could be readily identified. However, X patterns (one for each cylinder of the engine) would now be displayed in the same horizontal space as was formerly occupied by a single pattern. The crowding resulting therefrom would hamper proper clarity of wave form and would reduce the information obtainable from the test.

Types of Applications

The engine analyzer may be used for a wide variety of test work. In fact, any engine function that can be transformed to an equal electrical signal by a suitable transducer may be displayed. Since a wide-band and high-gain amplifier is employed, most transducers may be fed directly into the analyzer without preamplification. While the two largest fields of application of the analyzer are electrical ignition operation and preignition studies, a more complete list of the already investigated fields include the following:

1. Ignition analysis: (a) secondary voltage, (b) primary voltage, (c) magneto voltage.
2. Flame and preignition studies.
3. Coil primary current.
4. Engine noise: (a) microphone, (b) vibration.
5. Combustion knock.
6. Ignition timing—spark advance.
7. Intake and exhaust valve operation: (a) leakage, (b) motion, (c) timing.

Preignition Problem

Observation of Preignition And Knock

Bowers and Isitt[5] report that knock and preignition have been with us since the early days of engine and fuel development. However, until recently little importance has been attached to preignition as a problem in the automobile engine. In aircraft engines of high specific output, preignition has at times been a serious problem leading to severe damage to pistons and valves with consequent loss of engines in flight. In late design automotive engines of high compression ratio, preignition has become a limiting factor in the power output of such engines. It has, by various road techniques, been demonstrated that a large percentage of late-model cars are preignition limited—rather than knock limited and that even in knock-limited cars some cylinders are preignition limited.

Techniques generally employed include audible and instrument methods. Laboratory procedure usually consists of an operating period during which combustion chamber deposits are built up, followed by acceleration tests during which audible knock is noted. The nature of the knock, whether uniform or of the "wild ping" sort is observed and the octane requirement is sometimes measured. Continued running of the engine after turning off the ignition is another observation of auto-ignition frequency employed.

In the instrument type preignition of the charge has been detected by employing the spark plugs as ionization gaps to observe the passage of an early flame front by a pipe on an oscilloscope trace.

All of these methods have value,

but the problem is difficult because a transient phenomenon must be observed in as many as eight cylinders at a time. The equipment to be described responds to the external vibrations of an engine caused by either knock or preignition. It impresses the output from a magnetostriction pickup onto an oscilloscope screen and differentiates between knock and preignition on a basis of the time that has elapsed since the ignition spark jumped. To permit identification of the preigniting or knocking cylinders individual sweep patterns for each cylinder are shown on the screen. To record the transient preignition phenomenon tape recordings of the oscilloscope signals are made and played back for further study. For more detailed evaluation of selected sections of the test, photographs are made of the oscilloscope pattern from a played-back tape. A strip camera of simple design is used for this purpose.

The above combination is versatile and flexible. The tape technique provides a cheap method of recording and in many cases is all that is required to permit evaluation of the data. Where closer study is desired through photographs this is made practical through the selection and photographing of only the interesting parts of the tape.

The complete instrumentation consists of the multicylinder knock analyzer, a recording translator, a dual channel magnetic tape recorder and a special camera. Figs. 4 and 5 show diagrams for obtaining the record and making the playback with the analyzer.

Detecting Abnormal Flame Fronts

Landis[6] refers to the use of the normal spark plug as an ionization gap for the detection of an abnormal combustion. In tests it was found that false indications of abnormal combustion were sometimes obtained. Since this difficulty was believed to be associated with interference from the ignition system of the car, a similar study was made using a nonfiring spark plug rather than the normal spark plug for the ionization gap.

The use of nonfiring or independent ionization gaps for the detection of abnormal combustion gave results which were based on a count of the number of abnormal explosions occurring in a given time interval. Since a counter would totalize all abnormal explosions regardless of whether they were occurring frequently enough to cause objectionable operation, it appeared that this method of evaluation might lead to results of little practical significance. As a result, the inoization-gap indications described in this paper were evaluated visually with an oscilloscope in order that scattered or isolated abnormal explosions could be ignored and that only sustained or continuous abnormal explosions be considered, since it was believed that only the sustained abnormal explosions would be likely to result in objectionable operation.

The tests were conducted in a 1953 eight-cylinder car of make "H." A production cylinder head was fitted with a second spark plug to serve as an ionization gap in each cylinder except No. 1. Each ionization gap was placed on the transverse centerline of the cylinder at a distance of about 3 in. from the normal spark plug. The seven ionization gaps were connected in parallel to a 67-volt d.c. battery which was in turn connected to the y-axis of a Socony-Vacuum engine-analyzer oscilloscope. The x-axis of this oscilloscope is driven by the firing of the normal spark plugs in such a manner that the horizontal sweep is returned to the starting point each time a plug fired. This oscilloscope also permits vertical separation of the traces so that events in individual cylinders can be compared. Each horizontal trace, therefore, represents the 90° of crankshaft rotation following spark ignition for a particular cylinder in an eight-cylinder car.

Summary

By using independent or nonfiring spark plugs as ionization gaps together with a Socony-Vacuum engine-analyzer oscilloscope, the following observations of deposit-induced abnormal combustion were made in a car on the road:

1. Two kinds of abnormal combustion were found; the first, CONTINUOUS or SUSTAINED abnormal combustion and the second, SCATTERED or ISOLATED abnormal explosions.

2. The CONTINUOUS or SUSTAINED abnormal combustion was definitely affected by fuel octane number, was eliminated by removing a portion of the combustion chamber deposits, and was readily identified by the "ignition off" technique.

3. The SCATTERED or ISOLATED abnormal explosions were not significantly affected by octane number, were eliminated by removing considerable combustion chamber deposits, and could not be identified by the ignition-off technique.

3. Fundamental Causes of Preignition

Preignition, say Sturgis et al.,[7] is becoming recognized as an increasingly important limitation to the performance of engines because a tendency toward preignition usually accompanies increases in compression ratio. The primary factors controlling the occurrence of preignition are the nature and composition of the combustion-chamber deposits and the ignition tendency of the fuel.

The relationship of fuel composition to its ignition resistance has been investigated, using as ignition sources hot deposits in single-cylinder engines and in automobiles, and hot spark plugs in a G.M. research engine. Pure hydrocarbons were found to differ considerably in ignition resistance, and usually there was no relation between ignition resistance and knock resistance. Blends were often nonlinear in their ignition response. Tetraethyl lead increased the ignition resistance of some hydrocarbons much more than others, its activity apparently being related to the amount of precombustion products present.

Commercial gasolines which had essentially the same research octane numbers differed in their tendency to be ignited by deposits and in their tendency to cause wild ping on the road. There was no good relationship between road octane numbers of premium gasolines and their resistance to wild ping. This indicates that, of several routes to a particular octane level, some are preferable to others in contributing preignition resistance to gasoline.

As a part of the continuous effort to achieve more efficient utilization of gasoline, the compression ratios of American passenger-car engines have been increased steadily. The petroleum industry has moved forward rapidly in the development of improved refining processes and has produced fuels of high quality to satisfy the knock requirements of these engines.

However, it is well recognized that the tendency for combustion-chamber deposits, spark plugs, or valves to become hot enough to ignite the fuel-air mixture prematurely also increases as engine compression ratios increase. This phenomenon can be expected to be more prevalent in the future as more high-compression-ratio cars appear.

As engines become limited in performance by preignition rather than by knock, the factors responsible for preignition must be brought under control if full utilization of gasolines is to be achieved. This paper will consider one of these factors, viz., the relative tendencies of fuels to be ignited by hot deposits or surfaces.

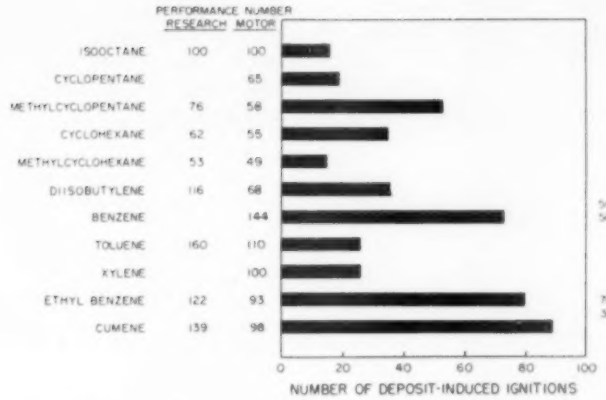


Fig. 6—Relative resistance of unleaded hydrocarbons to deposit-induced ignition in a C.F.R. engine, expressed as the average number of deposit-induced ignitions per 30-second rating period; spark advance 10° BTC.

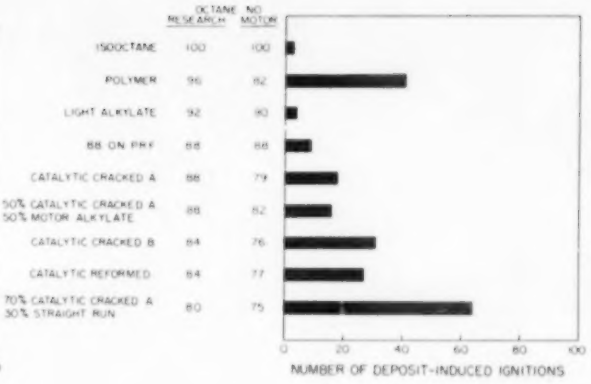

OCTANE NO.
RESEARCH MOTOR
ISOOCTANE 100 100
POLYMER 96 82
LIGHT ALKYLATE 92 90
88 ON PRF 88 88
CATALYTIC CRACKED A 88 79
50% CATALYTIC CRACKED A 50% MOTOR ALKYLATE 88 82
CATALYTIC CRACKED B 84 76
CATALYTIC REFORMED 84 77
70% CATALYTIC CRACKED A 30% STRAIGHT RUN 80 75
0 20 40 60 80 100
NUMBER OF DEPOSIT-INDUCED IGNITIONS

Fig. 7—Comparison of the deposit-induced ignition resistance of eight unleaded commercial gasoline-blending stocks in a C.F.R. engine; average number of deposit-induced ignitions per 30-second rating period; spark advance TDC.

Preignition Problem

It is known that combustion-chamber deposits are the primary cause of preignition in automotive engines. These deposits consist of fuel and oil residues and the decomposition products of tetraethyl lead. Under the proper conditions the lead compounds can promote the oxidation of the carbonaceous material to such an extent that the deposits will glow and ignite the fuel-air mixture. It is apparent that the tendency for a deposit to cause premature ignition depends among other factors upon the amount and type of carbonaceous material formed in the combustion chamber by the fuel and oil. The volatility and composition of fuels have been shown to have a bearing on the preignition harm of deposits resulting from their use. Heavy fuel components and aromatic constituents appear to form the type of deposit which promote premature ignition.

The contribution of fuels to deposit preignition harm is important; however, the relative resistance of fuels to ignition by hot deposits also is important in determining whether ignition will occur. This phase of the problem should receive consideration in the development of improved fuels. Therefore, it is believed of value to investigate fuel-ignition tendencies as well as the contribution of fuels to deposit harm.

Relative Ignition Resistance

Results of tests which used the two procedures showed that pure hydrocarbons differ considerably in their resistance to ignition by combustion-chamber deposits or by hot metal or ceramic surfaces. Fig. 6 illustrates the relative resistance to deposit-induced ignition of 11 hydrocarbons, as measured by the D 909 engine technique. Although the data are not extensive enough to compare one hydrocarbon class with another, it is apparent that ignition resistances of compounds within a given class vary greatly.

Aromatics usually are considered prone to ignite. Of the five tested, benzene, ethylbenzene, and cumene did ignite readily, but toluene and xylene were almost as resistant to ignition as isooctane. Similar differences, although not as great, were seen among the four naphthenes tested. Introduction of unsaturation into isooctane to form diisobutylene increased the ignition tendency.

It is plain that no correlation exists between the ignition resistance and knock resistance of these hydrocarbons. The factors which influence ignition resistance must differ from those which influence knock resistance, and very little is known about them.

In a 10:1 compression-ratio G.M. research engine, in which preignition was induced by hot spark plugs, the aromatic hydrocarbons also differ considerably from one another in their resistance to ignition. Toluene and xylene appear to be more resistant than isooctane, whereas benzene, ethylbenzene, and cumene are considerably poorer. At high engine speeds benzene is the more readily ignited than diisobutylene, whereas at lower speeds diisobutylene ignites more easily. It appears that fuels can differ in temperature sensitivity with regard to preignition as well as knock. There is less tendency for preignition at lower engine speeds because of lower spark-plug temperature.

Ignition Resistance of Mixtures

Although the tendencies of individual hydrocarbons to ignite are of interest, the behavior of hydrocarbon blends is more important. It is known that hydrocarbons frequently do not blend linearly with respect to their octane numbers, but no information has been available concerning the blending values of hydrocarbons with respect to ignition resistance.

From results of tests made on blends of isooctane and benzene it appears that relatively large amounts of benzene can be tolerated in admixture with isooctane without greatly increasing the deposit ignition tendency. These results indicate that unusual blending values exist between some hydrocarbons.

Fig. 7 shows the relative ignition tendencies of several unleaded commercial gasoline-blending stocks together with their A.S.T.M. research and motor-method octane numbers. These blending stocks varied considerably in their resistance to deposit-caused ignition, and there was no good relationship between ignition resistance and knock resistance.

A considerable spread in ignition resistance between unleaded gasoline-blending stocks also exists as measured by the hot-spark-plug method. All of these blending stocks were more readily ignited than 88-octane-number primary reference fuel.

Effect of tetraethyl lead . . . Tetraethyl lead will improve the ignition resistance of most fuels, but there are a few fuels which do not respond to it. This fact is illustrated from results of single-cylinder-engine deposit-induced ignition tests, and results obtained with the hot-spark-plug procedure. In each case 3 ml. of tetraethyl lead as motor mix was added to the fuel. In general, tetraethyl lead increases the ignition resistance of those fuels to which it contributes knock resistance, and does not affect the ignition resistance of those fuels which have very poor tetraethyl lead susceptibility relative to knock.

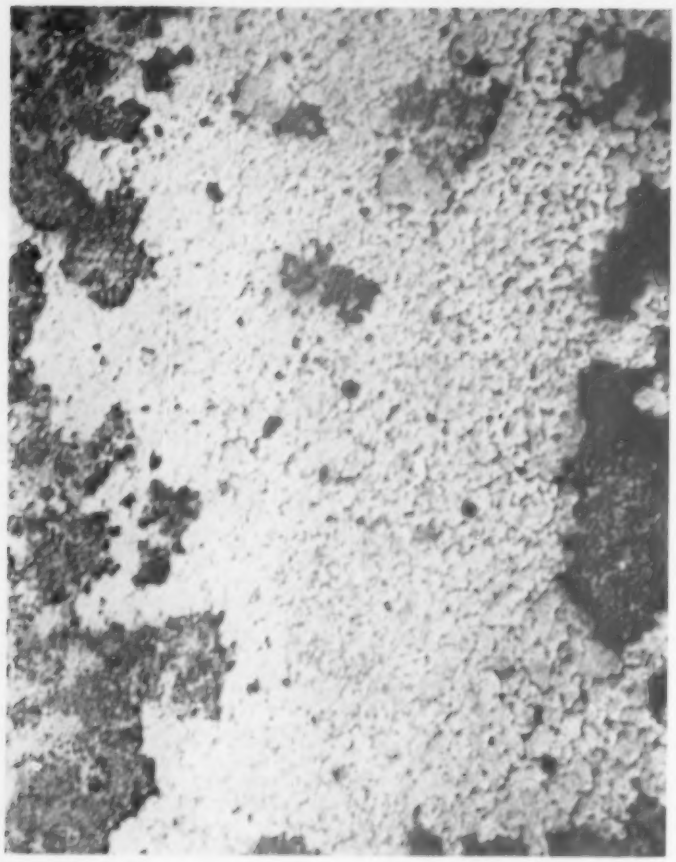


Fig. 8—Enlarged photograph of a small section of combustion-chamber deposits adhering to the top of a piston.

Preignition Problem

Laboratory Slices Carbon Deposits

Techniques developed in the medical profession are being used by du Pont's petroleum laboratory for studying combustion chamber deposits. When the medical researcher wants to examine cell tissue he uses a microtome for shaving off very thin transparent slices of the tissue for microscopic examination. Similarly, combustion chamber deposits can be shaved into thin slices for chemical or X-ray analyses. The enlarged photograph, Fig. 8, shows a small section of combustion-chamber deposits adhering to the top of a piston. If a portion of this deposit is dipped in wax to prevent the particles from crumbling, it is possible with a microtome to shave off horizontally slices only 0.001 in. thick. The wax can be removed from a shaved particle by washing with normal hexane.

The photograph, Fig. 9, was taken through a microscope to show a vertical cross-section of one of these deposit particles. The black area at the bottom of the photograph consists largely of carbonaceous material formed by decomposition of the fuel and oil. This is the material which binds the deposit to the combustion chamber wall. The light area on top of the carbonaceous material is composed of lead salts originating from the combustion of tetraethyl lead in the fuel. Also contained in this layer are interspersed particles of carbonaceous materials.

Because deposits increase the knocking tendencies of an engine, a great deal of effort is being devoted by the petroleum and automotive industries to controlling this important factor in knock. The development of the microtome technique permits stepwise analyses of deposits. Like a geologist studying the earth's strata to learn how nature created certain rock formations, it is now possible for the researcher to determine the chemical composition of different layers of deposit and thus obtain valuable information on how these deposits were formed and why they are harmful.

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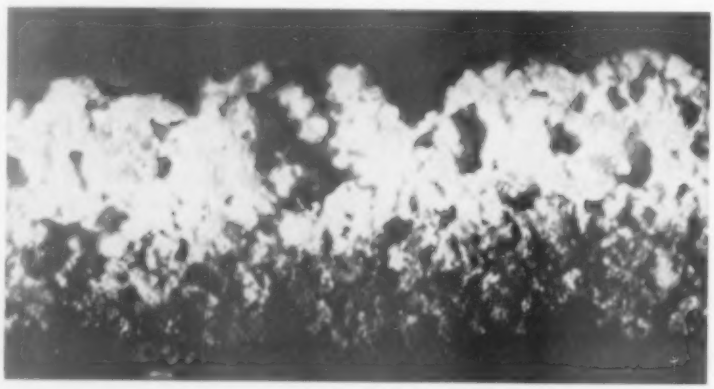


Fig. 9—Photo taken through a microscope of a vertical cross-section of one of the deposit particles adhering to the top of a piston.

Recent asphaltic limestone study poses...

New Questions On Origin of Oil

by D. D. Utterback

- **Is the presence of oil more closely related to environment than to migration?**
- **What unique environmental conditions can cause accumulation?**
- **How far can we go in assuming migration to be essential to accumulation?**

SINCE the formulation of the anticlinal theory of oil accumulation by H. D. Rogers in 1860 and T. Sterry Hunt in 1861, followed by its rediscovery by I. C. White and Edward Orton, no new fundamental theory has been developed that is of major significance to the problem of finding oil.

In its subsequent application, the anticlinal theory is more correctly called the structural-trap theory of oil accumulation. In this broader sense it includes all accumulations where additional movement of the oil upward or horizontally has been stopped by an impervious barrier overlying a porous and permeable reservoir horizon.

From time to time great emphasis has been placed upon specific types of traps which were temporarily very popular, such as strand lines and limestone reefs. These have not been new or different occurrences, however, but were popular due to the fortuitous discovery of major accumulations at the time.

Throughout the history of petroleum geology a great many improvements and refinements in methods of discovering structural and stratigraphic traps for oil accumulations have been made. These contributions have been of major importance and on the whole constitute additions to geologic knowledge and techniques that may very well be the outstanding contributions to the science in the last century. These include all the great variety of lithologic, paleontologic, and geophysical subsurface methods.

The significant characteristic of all these techniques is that they have been specialized and advanced methods for predicting the location of the conventional trap in which oil accumulation may be expected. Except as these studies may have aroused the curiosity of some workers, all of the techniques developed and the great mass of effort have not resulted in any contribution to the fundamental theory of petroleum geology.

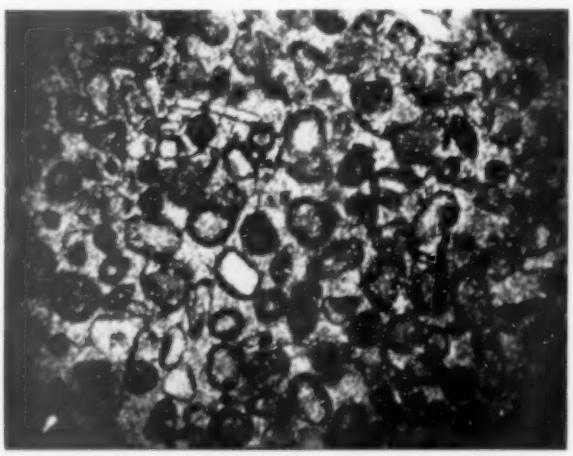
At the present time, despite an enormous amount of research, the fundamental and important concepts of the origin and migration of oil and gas are almost at the same stage of speculative theory as they were 30 years ago. It is believed that these fields furnish a great opportunity for the formulation of reliable and workable concepts that can more sharply focus our efforts and increase the efficiency of our search for oil.

Many working geologists of today approach the problems of origin and migration with a complete lack of critical analysis. The literature is filled with innumerable and contradictory explanations that can reasonably be classified as poorly considered expediencies to justify an individual circumstance.

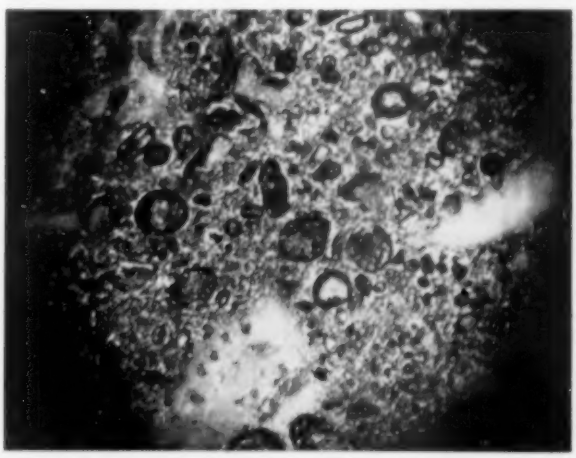
The treatment of faulting in relation to oil accumulation is an outstanding example. A review of the literature develops a definite impression that a fault is used in the diametrically opposed roles of an easy avenue for migration or a positive barrier to migration, depending upon which the author likes better at the moment.

In explanations of origin, similar inconsistencies are common. It is rare to find an author making any effort to explain an oil accumulation by any means other than migration from a relatively unknown source, either nearby or at great distance.

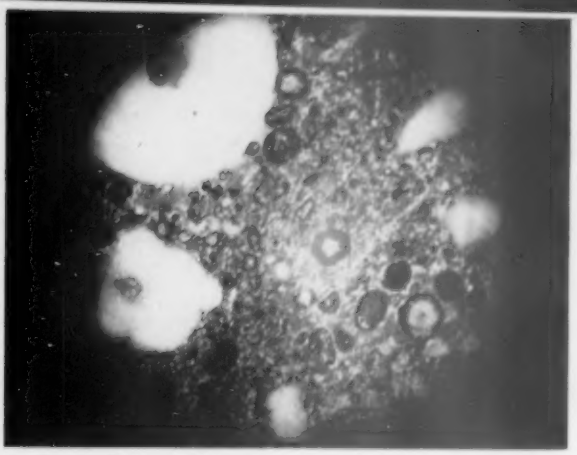
In a recent publication the hydrocarbon in a deposit of asphaltic sandstone was attributed to migration from underlying oil reservoirs. Using published estimates of the total quantity of heavy oil in these sands and allowing for a reasonable amount of shrinkage due to loss of lighter fractions, this explanation means that more than three times as much oil migrated from these



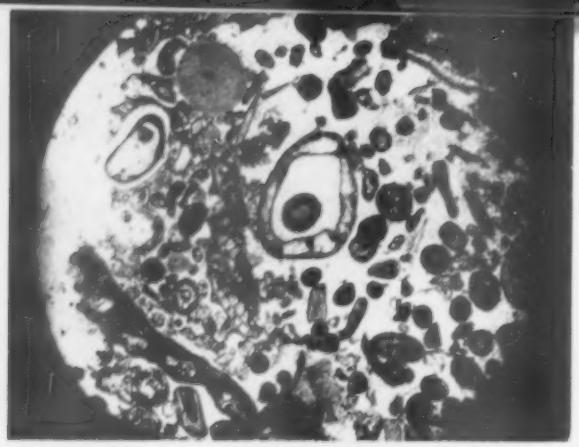
RICH ASPHALT-BEARING oolitic limestone from northern Alabama. Oolitic asphalt bodies and calcite nuclei prominent. x 16. Fig. 1.



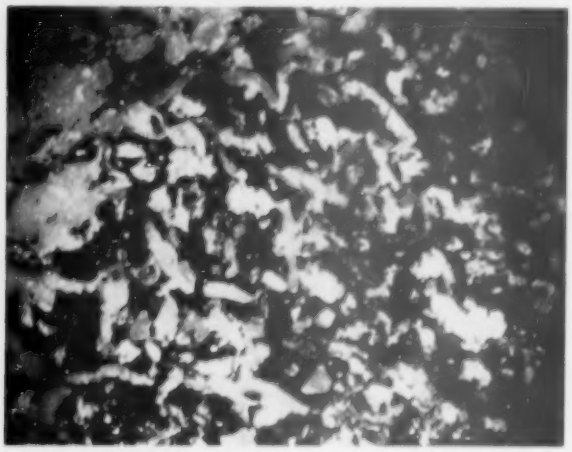
ALABAMA OOLITIC LIMESTONE. Oolitic asphalt concentrations and microfossils with asphalt border. x 10. Fig. 2.



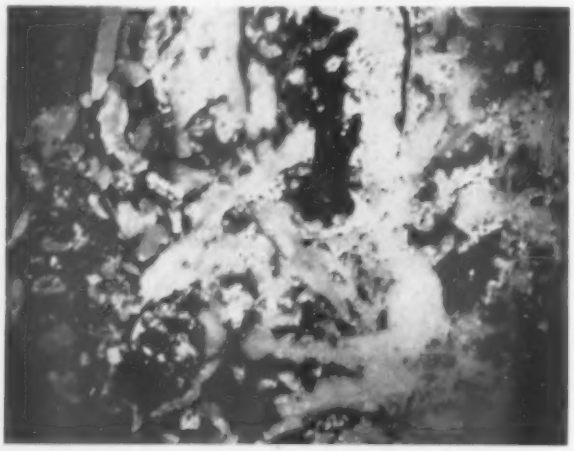
ALABAMA OOLITIC LIMESTONE. Large and small oolites with asphaltic border and calcite nuclei. Large fossil crinoid stems, white and unstained with no border of asphalt. x 10. Fig. 3.



THIN SECTION of low-grade Alabama oolitic limestone. Calcite nuclei prominent. Examples of alternate banding. x 10. Fig. 4.



ASPHALTIC ANACACHO limestone of Uvalde County, Texas. Small angular particles of limestone imbedded in asphaltic matrix. Asphalt predominant. x 16. Fig. 5.



ASPHALTIC ANACACHO limestone. Very irregularly shaped limestone particles in asphalt matrix. x 16. Fig. 6.

unidentified and unproved deeper sources as has been discovered on the North American Continent in our complete exploration and production history. The uncritical attitude that permits acceptance of such inconsistencies has probably been more instrumental than anything else in preventing the development of a better and truer basic theory on origin and migration.

Several years ago the writer conducted an investigation of surface outcrops of limestones and sandstones containing asphalt or heavy oil. The purpose of this work was to develop positive information on the nature of these occurrences that would add to our knowledge of their origin. The following two examples lie at opposite ends of the Gulf Coast embayment and proved to be the most informative studied.

Gasper Lime of Northern Alabama

A bed of dense oolitic limestone containing apparent fossil remains and in places strongly impregnated with asphalt is exposed in a quarry about 2 miles south of Margerum, Colbert County, Alabama. This limestone is called here the Gasper limestone of Chester age.

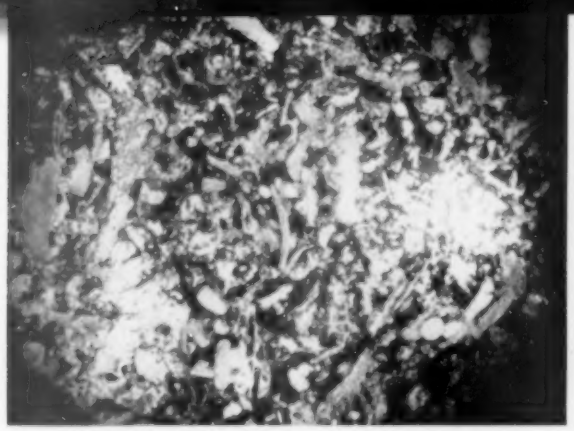
In the quarry south of Margerum the asphalt-bearing portion is about 10 ft. thick. It is light gray where free from asphalt, but usually colored dark gray to black by the asphalt content. Joints are numerous but usually tight. In those that are open, small amounts of asphalt have sometimes oozed out of the surrounding rock and stained the joint surfaces.

Thin sections and polished surfaces of this rock show that the asphalt is almost entirely restricted to small masses associated with oolites or narrow zones around the shells of microorganisms (Figs. 1, 2, 3, and 4). No connection exists between the individual globules of asphalt, and the rock shows no evidence of ever having possessed continuous porosity of any kind except along the joints.

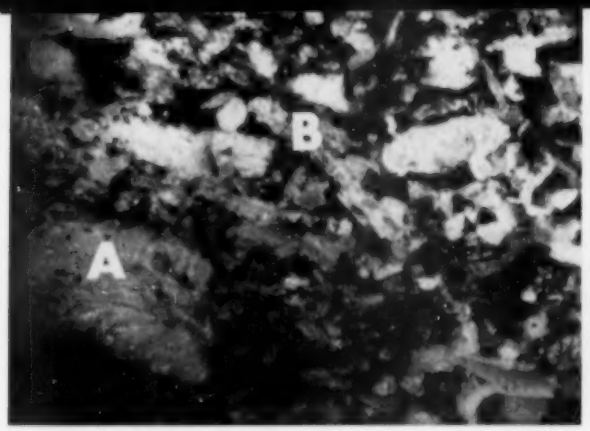
In the richer portions of the rock, every oolite is either a globule of asphalt or a small nucleus of calcite surrounded by asphalt. In the portions poor in asphalt, solid calcareous oolites predominate, but some containing asphalt are found singly and in groups irregularly distributed through the rock. Where relatively large fossil fragments occur, they are white and entirely free from asphalt or oil staining even though they may be surrounded by asphaltic oolites. Thin sections show that the calcareous nuclei of the oolites are more common and form a greater proportion of the rock than is apparent on the polished surface (Fig. 4).

Explanations in the literature of the origin of this deposit are limited to classifying it as a former oil reservoir which has become depleted following removal of the overburden by erosion. Another explanation that might be used is that it is an accumulation of asphaltic material resulting from depletion of an oil reservoir in some other locality. But the physical nature of this deposit seems to be definite evidence that it would have been a former oil reservoir. And the second explanation merely shifts the problem to a time and place that can be neither identified nor investigated.

Conclusions . . . The following conclusions concerning origin are obtained from the study of this deposit:

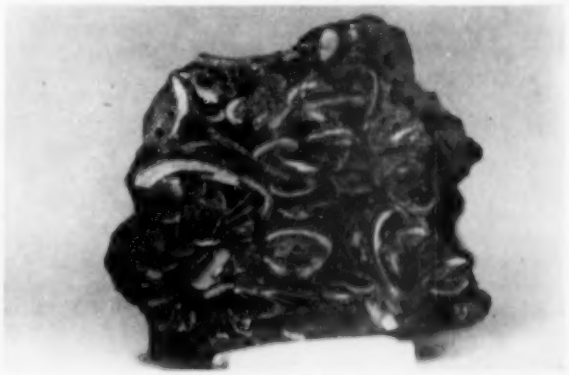


ASPHALTIC ANACACHO limestone not as greatly magnified as the preceding examples. Besides the many small angular particles, some long curved fragments are present. x 10. Fig. 7.



ORIENTED PHOTOMICROGRAPH of asphaltic Anacacho limestone. Horizontal plane from left to right. (A) and (B), empty pores in interior of fossils. x 16. Fig. 8.

SPECIMEN OF MODERN coquina artificially saturated with asphalt. Surface photographed normal to bedding plane. Orientation and curved nature of fossil fragments prominent. x 2. Fig. 9.



SPECIMEN OF MODERN coquina artificially saturated with asphalt. Surface photographed parallel to bedding plane. Shells prominently curved and porous portions of shells filled with asphalt. x 2. Fig. 10.

1. The asphalt in the Gasper limestone is contained in and around oolites, but is absent in the matrix and also in cavities in large fossil fragments.

2. The occurrence is not a residual oil pool.

3. Because of the absence of openings in and around asphaltic material, it is concluded that it was originally deposited as a viscous mass of about the same density as it has at present.

4. The concentration of the asphalt renders it unlikely that it was formed by oxidation of oil carried downstream from an eroded oil pool.

Anacacho Limestone of Uvalde County, Texas

Location and description . . . In western Uvalde County, Texas, the Anacacho limestone of uppermost Cretaceous age has been extensively quarried for natural-asphalt road rock. This rock is exceptionally rich; its asphalt content is reported to be as high as 25 per cent.

The deposits are located on the south or downthrown side of the Balcones Fault zone along its southwest extension where it trends almost east-west. A feature not commonly found associated with most oil deposits is the abundant igneous activity of the region which consists of numerous basalt and phonolite intrusives. This igneous activity is probably of Eocene age.

The Anacacho formation is described as a hard, yellow limestone that contains some marly beds. The limestone is not pure, but in some places it contains large quantities of clay and in other places it is arenaceous. It is largely of organic origin and frequently is made up of comminuted shell fragments. The thickness of the whole formation is about 400 ft. in the western part of Uvalde County. Asphalt is common in the formation and is found not only from one end to the other of the outcrop but also in wells drilled south of the surface exposures where it is covered by younger sediments.

In the quarry examined and sampled, the rock is a fine-grained, pure limestone, most of which is highly porous. Throughout the exposure these pore spaces are filled with asphalt. The asphalt content does not seem to be constant but varies slightly from place to place. About 30 ft. of impregnated rock is exposed.

In those portions of the quarry exhibiting the highest strata, the uppermost beds are dense white limestone entirely free from asphalt. The division between impregnated limestone and dense limestone is not sharp, but consists of a few feet of lean rock in which the asphalt occurs in scattered spots. Joints are common and the surfaces of these are invariably strongly coated with asphalt which has at times even followed the joints up into the dense overlying rock but has not impregnated the wall rock.

When a polished surface of the highly impregnated rock is viewed under the microscope, it has much more the appearance of rock fragments imbedded in asphalt than of asphalt filling the pore spaces of a highly porous coquina as it has been described (Figs. 5-8). The shape of the limestone particles and their relative positions bear no suggestion of a mass of fossil fragments deposited in a body of water and the pore spaces later filled with asphalt. Even the high amount of porosity usually associated with coquina deposits does not account for the extreme conditions found in this material.

The accompanying photomicrographs show abundant fragments of limestone with no contact whatever with other limestone particles on the surface photographed. This condition and the high proportion of asphalt shown in the picture is so common in the richer portions of the deposit that it can hardly be due to accidental location alone.

Unlike the northern Alabama oolitic limestone, the asphalt in this material contains frequent small holes such as would be formed by imprisoned gas. Although many of the limestone fragments are of a chalky nature and would have easily been stained by contact with liquid oil, they are always white with no indication of oil stains even around the edges. Moreover, the small porous portions of fossil structures are not filled with asphalt.

Asphalt significant . . . The quantity of asphalt in the richer portions of this rock is significant. Since the standard method of per cent analysis is by weight, it can safely be accepted that the 25 per cent asphalt reported refers to percentage weight composition. Calculating to per cent asphalt by volume, using determined specific gravities of 1.11 for the asphalt and of 2.66 for the calcite and other rock material, one obtains a result of 44 per cent of asphalt by volume. Determinations of volumetric percentages by the writer on five representative samples gave results of 36, 39, 40, 42, and 43 per cent asphalt. These percentages are abnormal in any rock that has undergone any amount of compaction and lithification.

Where the rock of the quarry does not contain asphalt, it is characteristically dense and nonporous, e.g., a specimen from the upper barren portion a short distance from asphalt-bearing rock tested only 0.05 per cent porosity. Highly porous, barren portions of the formation may exist, but if so, they were not found by the writer.

Indigenous origin . . . The peculiar conditions of this deposit are best explained by indigenous origin consisting of contemporaneous deposition of some source material and the rock-forming detrital limestone, with the source material subsequently being changed into asphalt without ever having been a liquid oil.

The rock has been described as a coquina exactly similar to the shell deposits forming in places along the coast of Florida today, and it is true that those deposits characteristically possess such high porosities. The comparison, however, is not entirely apt.

The modern coquinas are relatively coarse and deficient in fine materials, and their high porosity is due largely to the curved nature of the unbroken shell particles (Figs. 9 and 10). The shells composing the recent coquinas are also found to be generally oriented and lying as nearly flat as their curved shape will allow in the horizontal plane of deposition (Fig. 9).

In contrast to this, the asphalt-impregnated portions of the Anacacho limestone studied by the writer, though composed of angular particles, are fine grained and unsorted; curved shell portions are not common.

A study of the accompanying photomicrographs also verifies the impression of complete lack of orientation gained from more extensive microscopic studies of the material (Fig. 8). Porous portions of fossils are frequently not filled with asphalt in the Anacacho material, while in specimens of recent coquina that were artificially saturated with asphalt, all such portions are filled. This is a fundamental difference that would be expected to exist between a substance that had been filled with a liquid material and one that had been imbedded in a semisolid substance.

Migration into as fine-grained a rock as the Anacacho limestone would have had to be accomplished by a very liquid substance of low viscosity. An oil of this type, upon loss of volatile materials, would have been greatly reduced in volume, and the resulting rock would have exhibited a coating of asphalt around each rock particle rather than a complete filling of the interstices between the limestone fragments.

Moreover, it has been shown that in some of the richer portions of the rock, the limestone grains are not in contact with one another but are embedded in the asphalt so that when it is removed, the residue is a loose sand.

Conclusions . . . The following conclusions concerning origin are obtained from this deposit:

1. The bitumen in the Anacacho limestone was deposited contemporaneously with the material with which it is associated.

2. The rock is not an impregnated coquina, but consists of fragments of limestone in a bituminous matrix.

3. It is not a residual oil pool, although under proper conditions it might have been converted into an oil pool. This distinction between it and the Alabama occurrence is due to the difference in the associated limestone, not to any variation in the bitumen of the two deposits.

Origin in Situ

The conception of the origin of petroliferous deposits in situ has been advanced a number of times. This has usually occurred where it has been possible to study a deposit in detail at a surface exposure.

Some of the deposits for which in situ origin has been advanced are an asphaltic limestone in Estonia, an asphaltic Tertiary limestone of southern France, and the Athabaska oil sands of Canada. Other examples can be found in geologic literature.

In addition, a few writers have explained subsurface oil accumulations by the rich local accumulation of organic material without relying upon extensive vertical or lateral migration.

Positive data . . . The two examples given here, and additional examples found in the literature, furnish some positive data that may be used in finding an answer to the problem of the origin of mineral hydrocarbons. This is in contrast to the absence of positive factual data available to support the prevailing conception of migration from shale-source rocks.

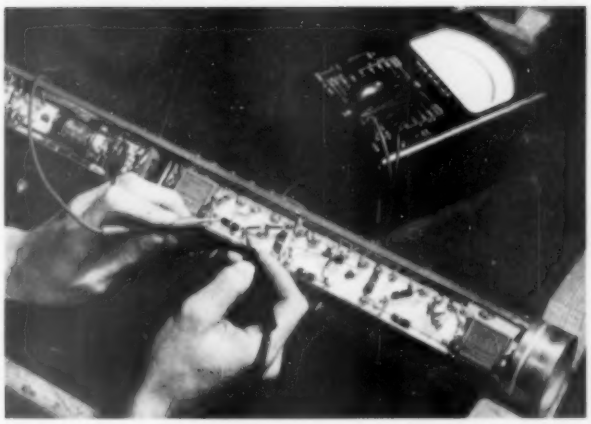
Unfortunately, in the absence of actual observations of generation and accumulation, and because of the priority enjoyed by the migration and shale-source rock theories, any proof of indigenous origin must be negative in nature. Only by demonstrating the absolute impossibility of a given occurrence resulting from secondary impregnation can the many varied and ingenious adaptations of the older theory be avoided.

Volumetrically, oil and gas occur very rarely in the sedimentary rocks of the earth's crust. Even in the Gulf Coast where accumulations are widely varied in stratigraphic position and very numerous in lateral occurrences, concentration in any one specific time-interval reservoir is limited in amount and extent. So it is not at all unreasonable to explain the Gulf Coast accumulations by unique and specialized conditions that could exist in a few small localities at any one time over the wide extent of the Gulf Coast embayment. The fact that some individual time-unit reservoirs are more prolific than others strongly supports the conclusion that the presence of petroleum accumulations is more closely related to unique environmental conditions than it is to indiscriminate migration.

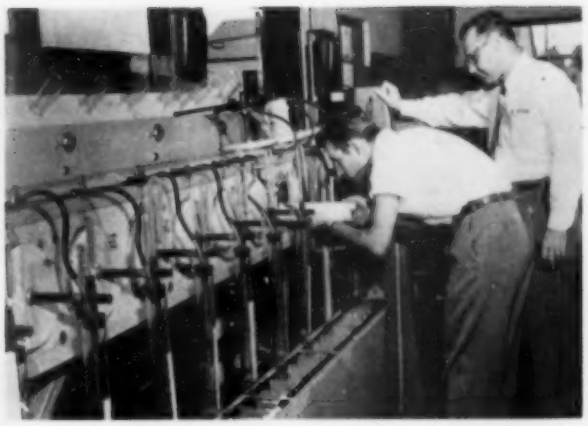
Limited migration must be accepted under any concept of oil accumulation. But even the most extreme limitation must admit to sufficient movement to accomplish gravitational separation within the reservoir. The evidence indicating a greater degree of migration within the reservoir—and, in exceptional cases, from reservoir to reservoir—seems incontestable.

THE AUTHOR

D. D. Utterback is geologist with Freeport Sulphur Co. in New Orleans. He has been engaged in oil and gas exploration work in the Gulf Coast since 1938. He is a graduate of the University of Illinois, having received his Ph.D. degree there in 1936.



SILICONE-GLASS LAMINATES are used as mounting strips in the gamma-ray logging tool employed by Schlumberger Well Surveying Corp. The strips withstand well operating temperatures.



SILASTIC O-RINGS are used in vacuum retorts by Core Laboratories. The silicone rubber withstands high operating temperatures which deteriorated previously used organic rubbers.

SCRAP SILASTIC is used by Vector Manufacturing Co. to pack a toroidal inductor coil in its case after stamping silastic washers from sheet stock.

SILICONE COMPOUND used on Lane-Wells firing equipment protects connections from well fluid under high temperatures and pressures.

SILICONES—New Tools for Petroleum Operations

...They find application in drilling and well servicing

by F. Lawrence Resen
Gulf Coast District Editor

A BEHIND-THE-SCENES look shows that many silicone products are used in equipment for many drilling and well-servicing applications.

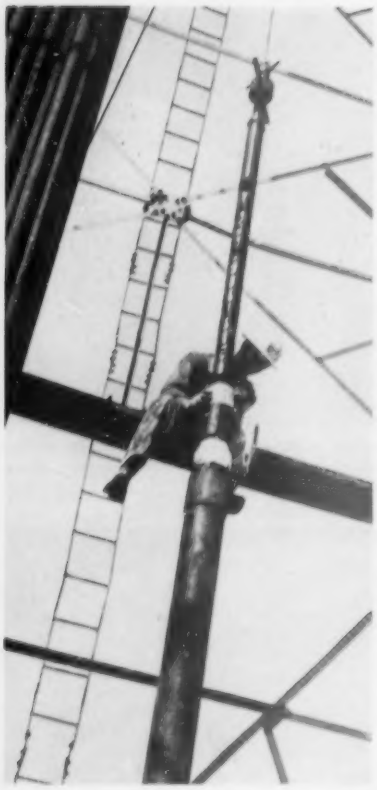
Some of the uses may be strictly limited to a specific service, although most will find parallel applications throughout the industry or suggest the use of these organo-silicon materials to solve other problems.

Damping medium . . . Silicone fluid Dow Corning 200, serves as a high-temperature damping medium in the drift-angle and direction-survey tool designed by Halliburton Oil Well Cementing Co. By retaining an almost constant viscosity from room temperature up to bottom-hole temperatures as high as 400° F., the fluid helps the tool to remain accurate within half a degree at angles up to 13°.

The tool is made of three instruments. Direction is shown by a compass with a highly polished "north" arm, suspended in a glass-bottomed plastic case filled with a light-viscosity silicone fluid.

Drift inclination is shown by the position and relative angle between two other polished arms which swing freely within another glass-bottomed case filled with a heavy-viscosity silicone fluid. The cases are mounted in the tool with their glass windows facing. Between them is a set of photoelectric cells geared and wired to constantly scan and log the changes in both faces as the tool is lowered down the well.

Halliburton has also standardized on silicone-glass laminate as terminal board in their survey tools which are subject



ENTERING A HOLE with Atlas Corp. gun. Silicone grease on primer-cap threads stand up against corrosive gases generated.

SILICONE COMPOUND has been used by Dowell Incorporated on various electrical sockets of subsurface tools.

to high temperatures or to the thrust of moisture condensation, as in a telemetering assembly.

Fishing jars . . . The newly developed nitrogen-impact fishing jar, designed by Houston Oil Field Material, Inc., utilizes compressed nitrogen, silicone fluid, and a special design to deliver a 208-ton blow at 60 m.p.h. without jarring well rigging or draw works. The jar strikes its blow while the fish is held in tension without requiring the use of drill collars in the string.

Impact is produced by a free-moving hammer driven by compressed nitrogen gas. The jar is so designed that when the drill pipe is slacked off, the gas is compressed by the hammer moving down with the drill pipe. At maximum gas compression, the hammer is locked by a hydraulic dashpot piston whose upward movement, in turn, depends on the passage of a certain amount of silicone fluid through an annulus. During the delay while the fluid passes through, the drill pipe is moved up and a taut strain taken on the fish. The instant the fluid is passed, the hammer strikes. For subsequent blows, the jar is cocked by slacking off weight and then taking a strain on the fish as before.

Delay may be regulated from a few seconds to a half-hour by varying the quantity and viscosity of the silicone fluid. When the jar was first tested, an extremely heavy (12,500 cs.) fluid was used, with firing delayed some 3½ hours. Further variables may be caused by different operating temperatures and pressures, but these factors can be compensated for with a little experimentation.

Silicone fluid was selected as the dashpot oil because of its relatively flat viscosity - temperature slope. Organic oils would thin out rapidly when subjected to well temperatures plus the steadily rising temperature generated by the jar itself. Even the silicone fluid thins out slightly after 10 to 15 hours of steady operation, but at the same time, expansion of the metal fittings will overcompensate for the thinning and even gain several seconds of delay. The hydraulic piston and cylinder, for instance, are machined to a 0.003-in. clearance. In service, metallic expansion can reduce this to 0.0005-in. clearance.

Detecting tool . . . A set of magnets and an electric micrometer are used by McCullough Tool Co., Los Angeles, in a magnetic detector for precisely determining the sticking point of a string of pipe in deep wells. To do this, the tool must be unaffected by well fluid, temperature, or hydrostatic pressure.

This has been accomplished by filling the entire unit under vacuum with silicone fluid. The fluid serves to equalize pressures and keep the tool from collapsing. It also acts as a heat-stable capacitor dielectric and transformer oil. Voltages within the unit run as high as 300 volts at 120 cycles per second on 1/16-in. spacing.

Conditions which prevail in these deep wells may be seen from data recorded in locating a stuck point below 16,000 ft. Mud weight was 133 lb. per cu. ft., with a viscosity of 70; hydrostatic head was over 15,000 psi.; and temperatures were in the order of 460° F.

Logging tools . . . Schlumberger Well Surveying Corp., Houston, has been using silicone laminates, compounds, and rubber in the assembly of many of their well-logging instruments. For instance, large mounting strips in the gamma-ray logging tool, previously made of bonded-mica sheeting, are now made of silicone glass-fiber laminates.

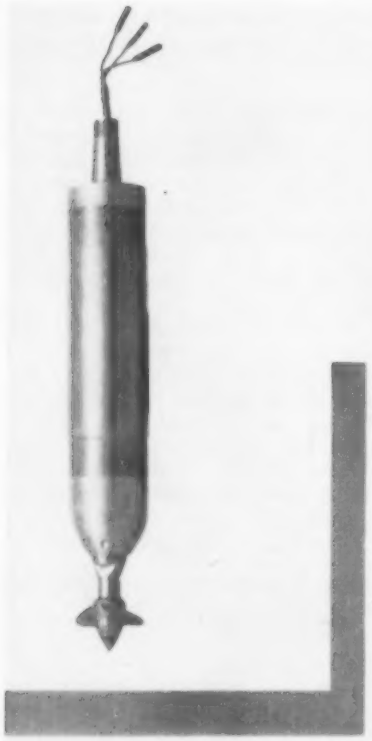
In assembly, the extremely fragile mica would fracture easily, and it was found that the silicone product could be handled more conveniently in addition to being able to withstand well-operating temperatures. Thus, the substitution was made.

Another feature of the silicone laminates was freedom from cold flow around rivets used to fasten the assembly to the tool. Smaller pieces of laminate are held in place with high-pressure split rivets. Phenolic laminates so fastened frequently loosened in service due to cold flow, while the silicone laminates are unaffected.

Silicone glass-fiber laminate is also used in control panels by Schlumberger primarily to overcome moisture condensation. Moisture absorption for these sections is in the order of 0.02 per cent as compared to 2 per cent for phenolics. For the same reason, all joints and connections in the instruments are coated with silicone compound, not only during construction but also frequently in the field.

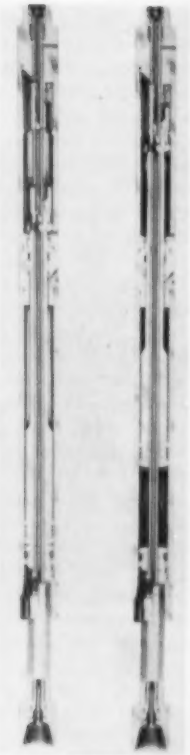
In the perforating-gun relay, resilience combined with high dielectric properties is essential and has resulted in the use of silicone rubber for this purpose.

Fluid separation . . . A permeable plastic "scrubber" or filter is produced by Petroleum Engineering & Tool Co., Houston, for use as a fluid separator. It also serves to remove moisture from



SILICONE INSULATION enables the Augerina, new tool for service operations, to operate indefinitely at high well temperatures.

SILICONE FLUID is used by Halliburton as a high-temperature damping medium in its drift-angle and direction-survey tool.



NITROGEN-IMPACT JAR designed by Homco uses silicone fluid as dashpot oil. The tool is used for fishing jobs.

hydrocarbon gases and to break the water out of distillate and crude-oil emulsions.

The scrubber is a phenolic plastic which is molded with certain fillers. The fillers are later removed, leaving a solidified hollow cylinder filled with myriad interconnected pores. Varying the fillers regulates the permeability of the scrubber from 10,000 to 50,000 md. and pore size from 5 to 50 μ. The molded product is treated with a hydrocarbon oil to prevent penetration of atmospheric moisture and to assure that pore surfaces will be preferentially wetted by hydrocarbon materials.

The filter separates gases by the process of diffusion. In a mixture of gases or a gas-hydrocarbon-water mist, the lighter gas molecules will penetrate a barrier of small openings and multi-directional passages faster than heavier-molecule materials, leaving them to concentrate on the upstream side of the barrier until they reach a saturation point, condense, and drop out of the stream.

The principle involved in breaking emulsions is based on the fact that two immiscible fluids cannot take possession of a surface at the same time. Already treated with hydrocarbon oil, the filter passes the oil in the emulsion easily, while the water tends to be repelled and subsequently coalesced into larger droplets which are easily drained off.

Highly effective in the majority of applications, the filters occasionally encounter a gas mist with such a finely divided moisture content that it cannot be extracted from the stream. On more than one occasion, also, highly stable water-in-oil emulsions have been encountered in which the water and oil molecules are so tightly bonded that the filter passage walls were not sufficiently hydrophobic to separate them.

In such cases, the ordinary plastic element is replaced with one which has been treated with silicone. Treatment simply consists of immersing the dry, untreated filter in the silicone fluid for 30 minutes or so, blowing it dry with compressed air, and baking at 150° C. for 48 hours. Filters thus treated are usually capable of separating the most stable emulsions and are recommended by Petco when the standard scrubber fails.

Core analysis . . . Vacuum retorts are used by Core Laboratories, Inc., Dallas, in determining oil and water saturations of whole core samples. Relatively low-temperature retorting is necessary so that the rock structure and composition is not altered, thereby enabling further tests (such as permeability and capillary pressure determinations) to be run on the same samples that are tested for oil, water, and gas saturations. High-vacuum techniques are employed to achieve complete retorting at temperatures ranging to 500° F.

Many problems had to be overcome in meeting the requirements for these tests. Not only temperature, high vacuum, and corrosion problems had to be solved, but also the equipment had to be designed so that the retorts could be charged and emptied easily and quickly if the results of the core analysis were to be useful for well completion.

A critical point in the apparatus was the seal for the lid of the retort pots. Ordinary rubber gaskets or O-rings would provide a satisfactory seal for vacuum leaks, but could not withstand the high temperatures. Siliastic, silicone rubber, was fabricated into an O-ring to meet these requirements and has performed satisfactorily.

The O-ring was not enclosed in the usual O-ring groove for this application because it was felt that a small amount of compression set was unavoidable and consequently leaks would develop. Hence, the O-ring is clamped between two nearly flat flange halves and subjected to a force of about 500 lb.

Samples are heated under a vacuum of about 2 to 3 mm. Hg for periods of up to 6 hours at a temperature between 400° and 500° F., while oil and water are taken off. During this period, the O-ring is exposed to hydrocarbons, sulfur, and other corrosive compounds found in petroleum-bearing formations. Under these conditions, an O-ring will last for some 30 or more runs.

Toroidal inductor . . . An interesting use for scrap silicone rubber has been found by Vector Manufacturing Co., Houston. In the manufacture of a new high-Q toroidal inductor, the inductor's doughnut coil is insulated from the case and to some extent held in position by broad silicone washers, top and bottom. Siliastic is an excellent dielectric and also provides a resilient cushion against physical shock even after prolonged operating temperatures as high as 400° F. Its high thermal conductivity also helps dissipate heat induced in the coil.

In addition, after the gaskets are stamped from sheet stock, the leftover scrap is ground up and used to fill remaining voids within the inductor case. Packed in fairly solidly, the macerated rubber holds the coil securely in position without the use of additional frames or braces. It also furnishes an even greater cushioning and heat-conducting factor.

Electrical circuits . . . In operation of service tools, success depends upon ability to get an electrical current to the tools lowered in a well. Lane-Wells Co. uses an insulated copper wire inside of a steel wire cable to get an electrical current into a well from the surface. The critical area in transmitting the electrical current is where the end of the cable core is attached to whatever tool is being used.

The problem of transmitting an electrical current from the cable core to the tool is overcome in Lane-Wells operations by the use of insulated contact blocks. The point of contact between the cable core and the contact block in the cable head is exposed to heat, well fluid, and pressure. To insulate this connection from outside interference, a neoprene sleeve is placed over the cable core and contact block. The sleeve is filled with silicone compound to protect the connection from the well fluid. Field experience has proved that this compound protects the insulation of the connection from well fluids under high temperatures and pressures.

Perforating Guns Atlas Corp., Houston, reports the coating of primer-cap threads with silicone grease has reduced misfires in its last several hundred thousand shots by more than 75 per cent. Noncreeping after prolonged waiting periods at room temperature or after as much as 1 hour at well temperatures as high as 350° F., the silicone grease doesn't penetrate the powder cap and desensitize the charge.

The grease also stands up against the corrosive gases generated by the explosion Backflash is prevented and thread seizure, which used to be commonplace after five or six shots, is eliminated indefinitely.

Drilling mud . . . Dow Corning antifoam materials are used to blend a defoamer which has proven very successful on low pH (not above 10.5) emulsion muds. Several types of foam are encountered in oil-well drilling muds. These foams cause low specific gravity and are difficult for pumps to pick up. The silicone-blended defoamer usually works where previously used materials, such as pine oil, tall oil, and castor oil, are not effective.

Slant-hole tool . . . Silicone insulation (Class H) is being used in a new motor-driven tool for getting rework and survey tools to a specific location in a slant or deviated hole. Now in the development stage by Haskel Green & Associates, Santa Fe Springs, Calif., the unit operates from standard portable survey equipment.

It is used to carry any electric line tool into the hole. The new tool will withstand more than 8,000 psi., and will move at 500 ft. per minute through oil-base mud. The unit is completely explosionproof, and can operate indefinitely in the hottest wells, thanks to the heat-resistant silicone insulation.

MACHINIST Louis Schneider adjusts alignment table he designed to increase milling accuracy.

New table permits better alignment

AT Esso Standard Oil Co.'s Bayway refinery machine shop, Louis Schneider works the level of an alignment table he designed for boring mill.

The table consists of a hydraulic-lift table for vertical positioning and a 6-in. travel table for horizontal movement. It is accurate enough to line up work at the mill to 0.001 in. The lining up was formerly done by a crane which is now free for other jobs in the shop.

Diagnosing engine ailments

DURING the normal operation of machinery, such as gas engines, pumps, and compressors, an operator will often be forewarned of an impending failure by knocks in moving parts, such as piston slap, bearing knock, or faulty valves. However, once the noises are detected, it is often very hard to pinpoint the trouble without dismantling major parts of the equipment.

The proposal was made to use a Herbrand Multiscope for detecting engine knocks and similar noises in other equipment. The instrument operates on essentially the same principle as a physician's stethoscope and resembles one in that it is equipped with rubberized hearing inserts for placing in the ears. Its length of tubing is connected to a long pointer. The pointer is touched on the surface where moving parts are housed and the point of loudest noise or knock indicates trouble near this point.

Suggested by Esso Standard Oil Co., Baton Rouge, La.

Mid-Continent operators explore possibilities of

Permanent-Type Well Completions

Advantages . . .

1. **Lower completion and remedial costs**
2. **More accurate reservoir-performance knowledge**

by C. B. Strauch, G. W. Atchley, and E. R. Daniel

OPERATORS in some areas are saving time and money by using permanent-type well completions. The term, permanent-type well completion, refers to wells in which the tubing and well head are installed only once in the life of the well, and all work subsequent to the setting of the well head is done through the tubing using wire-line tools.

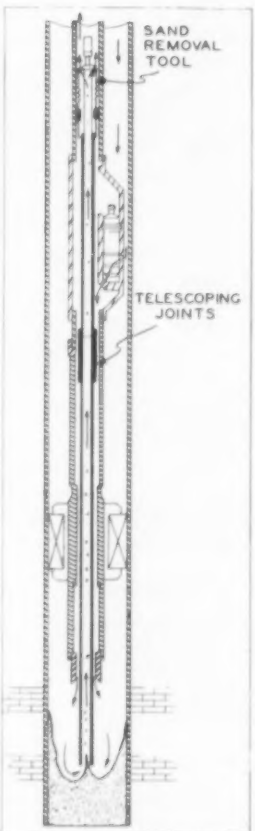
Authors are with Republic Natural Gas Co., Pauls Valley, Okla. Paper presented at Mid-Continent district meeting, A.P.I., Oklahoma City, March 18, 1954.

To date, such work as radioactive logging, perforating, plugging back, cementing, and installing gas-lift equipment has been done through the tubing with much success.

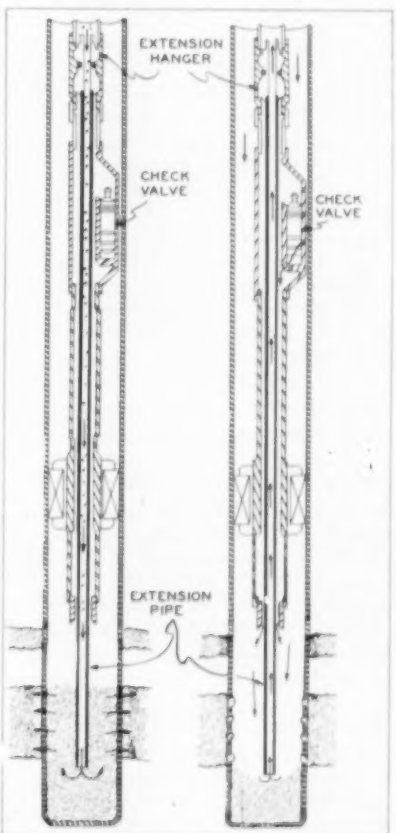
The initial development of the permanent-type well completion was begun by Humble Oil & Refining Co. engineers about 4 years ago. The service companies have actively participated in the design and construction of equipment for use in permanent-type completions, and today it is possible to use lightweight wire-line equipment in all completion and remedial work subsequent to the initial setting of the tubing.

A permanent-type completion is achieved by running the tubing open-ended, and setting the bottom of the tubing a sufficient distance above all possible productive formations to allow checking at least one casing collar for reference in perforating. When preparing a well for permanent-type completion, the following factors and procedures should be considered:

1. Tubing should be open-ended.
2. The bottom of the tubing is set above all possible productive zones.
3. A drift bar should be run prior to running the tubing to make certain it is full open.
4. Packers and landing nipples that will allow passage of the wire-line tools should be selected. In addition, packers that do not require excessive setting weights should be selected. (Setting a packer with excessive tubing weight may cause kinks that would restrict the running of wire-line tools.)
5. After setting the tubing, the drilling mud is displaced with either salt water or oil. The use of oil is generally preferred because of the adverse effects water has on the formation to be produced.
6. In preparing the well for perforating, the tubing head is set and the fluid swabbed from the well bore until the desired hydrostatic pressure is attained. In the case of a flowing well, it is generally desirable to decrease the hydrostatic pressure by a sufficient amount to allow the well to come in by itself. This reduction of hydrostatic head should eliminate, or at least decrease, the plugging tendency across the perforations and around the well bore.



REMOVING sand from well bore is facilitated by telescoping tubing extension. Fig. 1.



PLUGGING BACK a depleted sand is accomplished by using the low-pressure, squeeze-cementing process. Fig. 2.

Perforator used . . . The tubing-type

perforator was the first tool developed specifically for use in permanent-type completions, and one currently in use employs the shaped charge, carried in an aluminum, self-destructive carrier, and shoots at an angle of 45° from horizontal. This gun is available in either 2⅛-in. or 1¾-in. o.d. The 2⅛-in. gun has four shots per foot (comparable to 4-in. shaped charge) and is run in 2½-in. o.d. or larger tubing. It is recommended for use in casing up to 7-in. o.d. and hole size of 9-in. maximum.

The 1¾-in. o.d. gun has five shots per foot (comparable to 2⅜-in. shaped charge) and is run in 2-in. o.d. tubing but not recommended for use in casing larger than 5½-in. in 7⅞-in. hole.

The tubing gun is limited to hydrostatic pressure imposed which could vary from 4,000 to 11,000 psi. depending upon construction and material of the carrier.

A perforating company reported the following jobs using the tubing-type perforator during the past year:

	Company wide		Mid-Continent	
Month—	Jobs	No. shots	Jobs	No. shots
November 1952	64	2,351	2	76
December	71	2,300	1	25
January 1953	77	3,065	10	231
February	78	3,462	7	423
March	107	4,476	1	25
April	72	2,792	3	84
May	83	3,024	2	76
June	86	3,490	1	116
July	106	4,204	0	00
August	133	5,471	7	44
September	127	5,053	0	00
October	100	3,833	1	25

The advantages offered by the permanent-type well completions that have been established by field experience are:

1. Longer life of well equipment because it remains in place during the life of the well and also because it is subjected to lower pressures.

2. Initial completion cost reduced by less rig time.

3. Cost of remedial work less because use of heavy and expensive hoisting equipment is eliminated.

4. Time is saved because work is performed more rapidly by use of lightweight, wire-line equipment.

5. Lower hydrostatic pressure on the formation while perforating reduces plugging of perforations and formation contamination.

6. More thorough test of the reservoir is economically feasible because of elimination of rig-time charges.

7. Operations are safer because tubing and well-head equipment are installed before the well is perforated.

In the Golden Trend . . . Portions of the permanent-type completion have been used in the Mid-Continent area, but to date a well has not been entirely completed by this method. As an example of the use of portions of the permanent-type completions whereby successful perforating has been performed at shallow and medium depths, three jobs will be described.

A well in the Golden Trend was perforated by the tubing-type perforator so that the well fluid could be swabbed low enough that the hydrostatic head would be less than the anticipated formation pressure. This well had a 7⅞-in. hole, 5½-in. casing cemented with a 1:1 mixture of 4 per cent gel cement and stratacrete, and was equipped with a 2-in. E.U.E. tubing and full-opening packer.

The drilling mud was displaced by water and the water by oil. Then 2-in. E.U.E. tubing was run with the packet set at 7,219 ft. The oil level was swabbed to 6,500 ft., and the Gibson sand (third Deese formation) was perforated with five holes per foot from 7,267 to 7,287 ft.

The tubing was swabbed dry; then the formation was treated with a 4,000-gal. sandfrac using 1 lb. of sand per gallon of oil. After treatment, the well flowed 40 bbl. of oil in 2 hours on ¾-in. choke with 500-psi. tubing pressure. All the load oil was recovered, and the well flowed new oil at rate of 10.5 bbl. per hour flowing through a ½-in. choke, with 865 cu. ft. of gas per barrel of oil. The oil gravity was 39.40 A.P.I.

While drilling this well, the Gibson sand had been open-hole drill-stem tested, and on 1-hour test, recovery was 40 ft. of slightly oil and gas-cut mud. The bottom-hole flowing pressure was 0, and the bottom-hole shut-in pressure was 1,375 psi. in 15 minutes.

Another reason for the use of this perforating method was to permit removal of the drilling rig after running the tubing and displacing the mud.

From results obtained, the job was considered successful. An estimated 48 hours day-work time was saved by not having the drilling rig on the well for the operations of perforating, making a trip with the tubing, additional swabbing after perforating, and waiting for fracture treatment.

In the Royal pool . . . A tubing gun perforator was used in a 4,000-ft. well in the Royal pool, Garvin County, Oklahoma. This well had a 9-in. hole and was equipped with 5½-in. casing, and 2½-in. E.U.E. tubing with no packer. The tubing was run open-ended and set at 3,247 ft., and the fluid level was swabbed to 3,000 ft. A tubing gun was run, casing collars checked, and the casing perforated from 3,283 to 3,290 ft. with 28 shots of 2⅛-in. shaped charges.

Upon perforating, the well gassed a little but would not flow. Subsequent swabbing resulted in negligible production, so the well was fracture treated with 2,000 gal. and 2,000 lb. sand. The maximum pressure was 2,700 psi. The swab rate then was 2 bbl. of oil per hour.

An insert-type rod pump with 1½-in. plunger was run and seated with a hook-wall packer-type holddown. After pumping up, the well pumped 53 bbl. oil per day on a 34-in. stroke, pumping 15 strokes per minute. This job was also considered successful.

A second well in Royal pool, Garvin County, Oklahoma, was perforated with the tubing-type perforator. A 9-in. hole was drilled to 3,800 ft. and 7-in. o.d. casing was set and cemented at 3,798 ft. Then 2½-in. E.U.E. tubing was run open-ended and set, with no packer, at 3,558 ft. The fluid level was swabbed to 3,000 ft. and a tubing gun was run, casing collars checked and casing perforated from 3,516 to 3,532 ft.

Upon perforating, the well gassed but would not flow. It was then swabbed and kicked off after three trips with the swab. Initial tests indicated a flow rate of 250 bbl. of oil per day on a 20/64-in. choke with a tubing pressure of 215 psi. and casing pressure of 650 psi.

A partial use of the permanent-type completion has been made in Oklahoma for gas-lift installations in relatively deep wells. For example, a well completed from a perforated interval of 10,815 to 11,025 ft. was equipped with a retrievable gas-lift valve which seats in an offset mandrel thereby leaving full tubing opening. After completion and gas-lift operation began, the working valve did not operate satisfactorily. The valve was removed by wire line, and another valve run and gas injection again begun within 2 hours after the wire-line truck reached the well location. A substantial saving was realized.

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2. LeBourge, M. P., and Hodgson, G. R., "A Method of Perforating Casing Below Tubing," Journal of Petroleum Technology, Vol. 4, No. 12, December 1952.

3. Huber, T. A., Tausch, G. H., and Dublin, J. R.: "A Simplified Cementing Technique for Recompletion Operations," Journal of Petroleum Technology, Vol. 6, No. 1, January 1954.

4. Kastrop, J. E.: "Wire-Line Methods Cut Workover Costs," World Oil, Vol. 137, No. 2.

		YES	NO
1	Do you know the first names of your employes?		
2	Do you feel your employes confide in you?		
3	Do you have a below-average absentee rate in your group?		
4	Have you had employes promoted from your group?		
5	Do you try quickly to solve causes of potential grievances?		
6	Do you ever visit a sick employe at his home?		
7	Do you try to handle your employes as individuals?		
8	Do you consider it more important to save an employe than to "scrap" him?		
9	Do you try to **sell** your people new methods instead of "shoving them down their throats"?		
10	Do you call employes in for face-to-face private discussion of problems?		

		YES	NO
11	Do you try to understand the employe's point-of-view when problems arise?		
12	Do you get quick, straight answers for employes to their questions?		
13	Do you try to get both sides of an argument before attempting to reach any decision?		
14	Can you discipline an employe and still hold his sincere respect?		
15	Do you treat all your people fairly—without playing favorites?		
16	Are your employes loyal to you—and do they speak well of you?		
17	Do you make yourself clearly understood to your employes at all times?		
18	Do your employes put in a full day's work—no loafing, no too-long coffee breaks, etc.?		
19	Do you have a good safety record in your group?		
20	Do you believe people work for more than money alone?		

A new version of 20 questions...

Take This Test—Find Out Your H.R.Q.*

*Human Relations Quotient

Find out your R.H.Q. Now supervisors in business, industry, and government can check their own H.R.Q.—their Human Relations Quotient. This 20-question self-quiz has been developed by Kelly-Read & Co., Inc., Rochester, N. Y., personnel-development specialists.

"Yes" or "no" answers to the 20 questions of the self-quiz will enable supervisors to determine their H.R.Q.—a measure of their effectiveness in human relations. This is working with people for maximum productive effort—one of the major responsibilities of supervision.

THE TEST

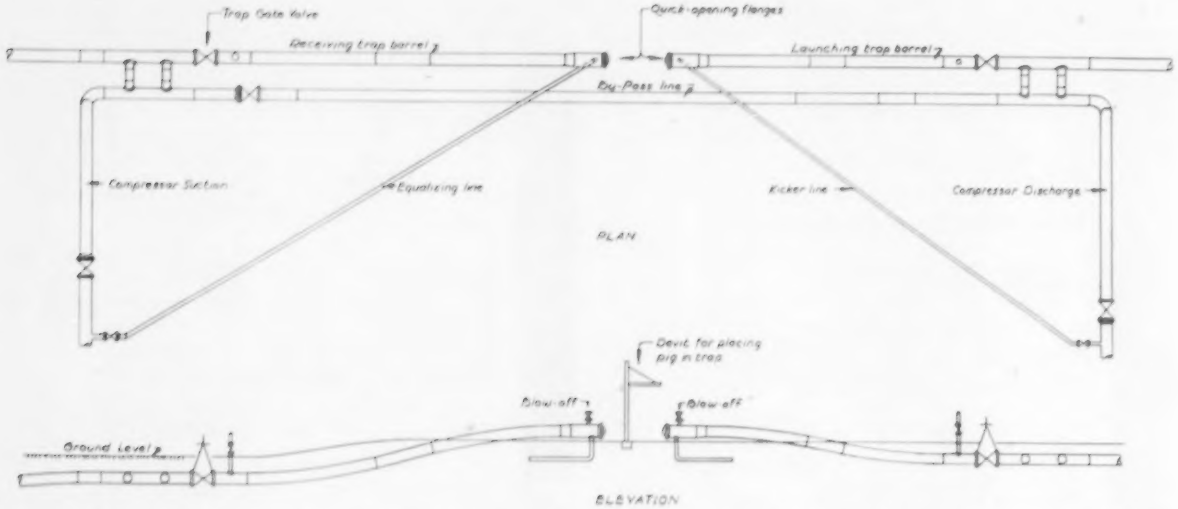
Think each question through carefully, then check "yes" or "no" in the space provided. Your honest "yes" measured on the yardstick below will help you figure your human relations effectiveness.

THE SCORE

"Yes" to all questions	Tops
"Yes" to 18 questions	Excellent
"Yes" to 15 questions	Good
"Yes" to 13 questions	Acceptable
"Yes" to 11 questions	Fair
"Yes" to 9 questions	N.G.

THE SUPERVISOR'S CREED

1. I will do everything possible to know my job completely. I will make it my business to understand my job as a supervisor and also understand every job I supervise.
2. I will always be a leader—and not a "driver"—explaining **how** and **why** in order to obtain most effective employe cooperation.
3. I will always make certain that my instructions are clearly understood, giving them in a simple and friendly fashion.
4. I will be a good planner—delegating work for most effective utilization of time and material. And I will always have an alternative plan should an emergency arise.
5. I will always try to keep high standards of conduct, performance, and quality.
6. I will judge my people "on merit" and not on prejudice—and I will let each of my employes know where he stands at all times.
7. I will give credit where credit is due—but not hesitate to discuss fairly and honestly individual errors or failures.
8. I will always practice sound safety procedures.
9. I will keep my promises. I will not promise what I can't deliver, and will deliver as promptly as possible on promises I do make.
10. I will represent my people fairly to management—and management fairly to my people.
11. I will seek to develop better employes at all times—since I realize the better my employes, the better job I can do, and the better record I will make.
12. I will never believe my own development as a supervisor is complete—I will constantly seek to make myself a better supervisor.



PLANNING for hydrostatic testing should include the installation of permanent scraper traps and launching heads for later on-stream scraper operations. Fig. 1.

Major advantages are offered

Hydrostatic Testing of Large Gas Pipelines

...but detailed planning is necessary

A safe testing procedure resulting in a well-tested line... this is what hydrostatic testing offers. However, if the test is not to degenerate into a fire-fighting, helter-skelter operation, careful planning in advance of construction is absolutely necessary.

by J. S. Powell and N. K. Senatoroff

HYDROSTATIC testing of large gas pipeline offers major advantages over other methods of testing but it can be costly and complex if not adequately planned.

Advantages are that tests can be carried on with less danger than with gas or air and that the completed line will have been better tested, since test pressures can be carried to a higher figure without fear of blowouts, if they occur, causing extensive damage.

Results of previous attempts to perform hydrostatic testing without careful, advanced planning is one important reason for the poor reputation enjoyed by such testing in the gas-pipeline industry.

Another reason has been the fear that hydrate line blockage will result from water remaining in the line after the test's completion. Contrary to this, the authors' experience indicates there is little chance for serious hydrate formation if proper care is used in removing test water and if adequately dehydrated gas is used for the line pressuring.

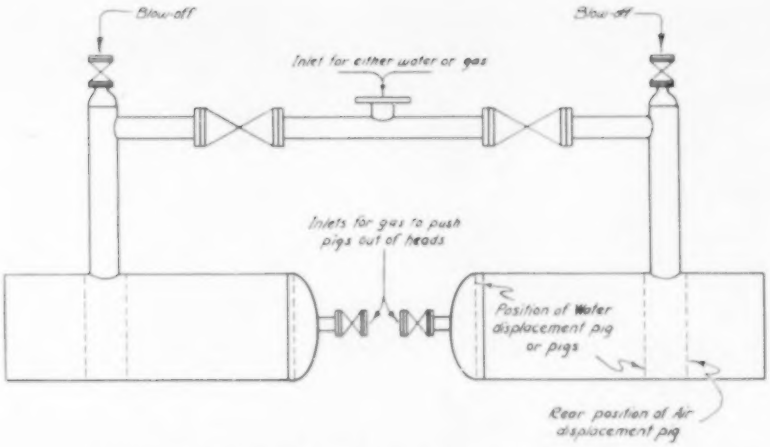
Method of testing... In brief, hydrostatic testing is conducted in this manner: After a section of the line is completed, water is pumped in at one end to displace the air by forcing ahead of it a plunger with rubber sealing cups called a "pig" or scraper. The filling of the line is accomplished rapidly by the use of a high-capacity pump. A high-pressure, lower-capacity pump is then employed to increase the pressure to the specified test pressure which can be much higher than the maximum working pressure.

This pressure is maintained for a specified period; any leakage of water from the line is indicated by a drop in pressure and the size of the leak by the pumping rate required to hold the test pressure. Leaks or "blowouts" in the line are then found by patrolling the right-of-way. After all the weak spots found have been repaired, the water is displaced from the test section by forcing a second pig through the line with gas or air.

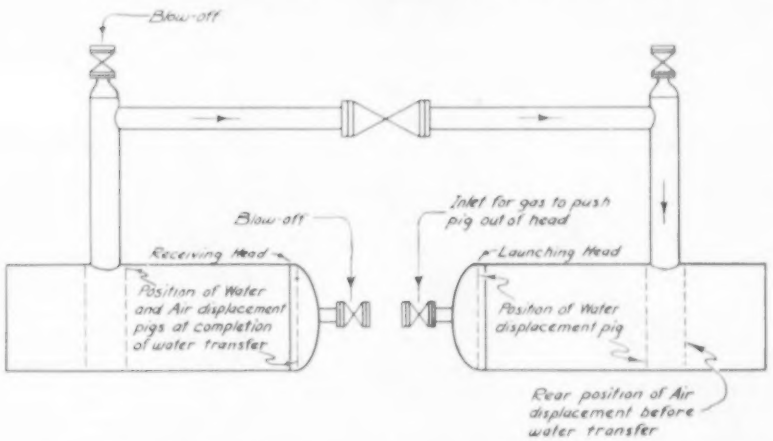
Advance planning... Several advantages result from planning hydrostatic tests well ahead of line construction. It enables the designer to foresee the financial needs related to the cost of special pipeline features needed for the test. It permits forecasting the organization personnel requirements for efficiently conducting the hydrostatic test. It provides the opportunity of weighing the relative merits of company versus contractor performing the test.

In brief, it substitutes a carefully planned, on-schedule type of activity for the fire-fighting type frequently observed where the hydrostatic test is conducted as an afterthought. Following are important features which should be considered in the design of a pipeline to be hydrostatically tested:

Authors are associated with Southern California Gas Co. and Southern Counties Gas Co., respectively. Condensation of a paper presented to Gas Supply and Transmission Conference of Pacific Coast Gas Association, May 12-13, 1954, San Francisco.


Blow-off
Blow-off
Inlet for either water or gas
Inlets for gas to push pigs out of heads
Position of Water displacement pig or pigs
Rear position of Air displacement pig

LAUNCHING HEADS and manifold for filling two test sections. Fig. 2.


Blow-off
Blow-off
Inlet for gas to push pig out of head
Receiving Head
Launching Head
Position of Water and Air displacement pigs at completion of water transfer
Position of Water displacement pig
Rear position of Air displacement before water transfer

LAUNCHING AND RECEIVING heads with manifold to transfer water. Fig. 3.

Pipe bends . . . It is recommended that the pipeline design specify pipe bends with a radius curvature of at least seven pipe diameters. If this is not possible, welding ells of not more than 22½° with a radius of 1½ pipe diameters are suggested.

Small changes in diameter due to a difference in wall thickness are not objectionable. However, the indiscriminate use of different pipe-diameter sections, in which discontinuity of pipe sizes might interfere with the passage of the pig, should be avoided.

Valves and fittings . . . The use of full-opening block valves is preferred to the extent permissible by other design considerations. If full-opening valves are not provided, sectionalizing of the line for testing must be between the main-line valves, unless these valves are installed after the test is completed.

Pig traps . . . In order to maintain maximum flow efficiency, many new lines which are in the planning or construction stage have included facilities for the "on stream" running of pigs as a permanent feature of the line itself.[1] Such facilities are very useful after a hydrostatic test and tend to reduce the cost of such a test in the case where several pig runs are contemplated.

Most users of pipeline pig traps report that the horizontal type is preferred to the vertical for both the suction and discharge piping of the compressor plants. The traps consist of a receiving and launching section of the pipe (the so-called trap barrels), mounted as shown in Fig. 1 with davits, quick-opening flanges, trap gate valves, bypass and blowdown lines, and the "kicker" line for dispatch of the pig.

The special temporary fittings and equipment which are considered essential for ease and convenience in hydrostatic testing are manifolds and launching and receiving heads, four designs of which are shown in Figs. 2 to 5.

The latest type of pipeline pigs are designed to "flow through" most of the properly sized and installed fittings and full-opening valves.

Pumps for filling . . . After selection of the locations for water supply, the question arises of selection of pumps which would be capable of not only filling the line with desired dispatch but also providing ample lift to meet the static heads encountered along right-of-way.

In sizing the fittings and connecting lines for water filling purposes some allowance in capacity must be made for peak rates of filling requirements. In some cases the recommended oversizing of equipment approached the 35 per cent figure, and has proved satisfactory for emergencies such as approach of bad weather, breakdown of other equipment, etc. In sizing gas connections excess capacity should be provided to overcome serious leakage past a stuck pig and thus build up the required differential to get the pig past the obstruction.

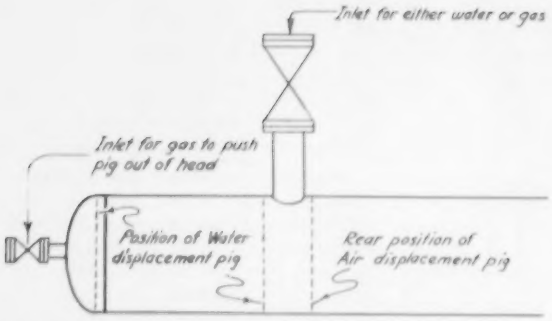
Water supply and disposal . . . A survey of available source of water along the right-of-way of the line is very important both from the standpoint of capacity and quality and should be made before construction planning is undertaken. The right-of-way should also be surveyed for means of water disposal after the hydrostatic test.

These two requirements, water supply and disposal, appear on the face as very difficult objectives to achieve in some instances. There are reported cases, however, in which the limited-water-supply problem was economically handled by reuse of the water in several sections of the line.

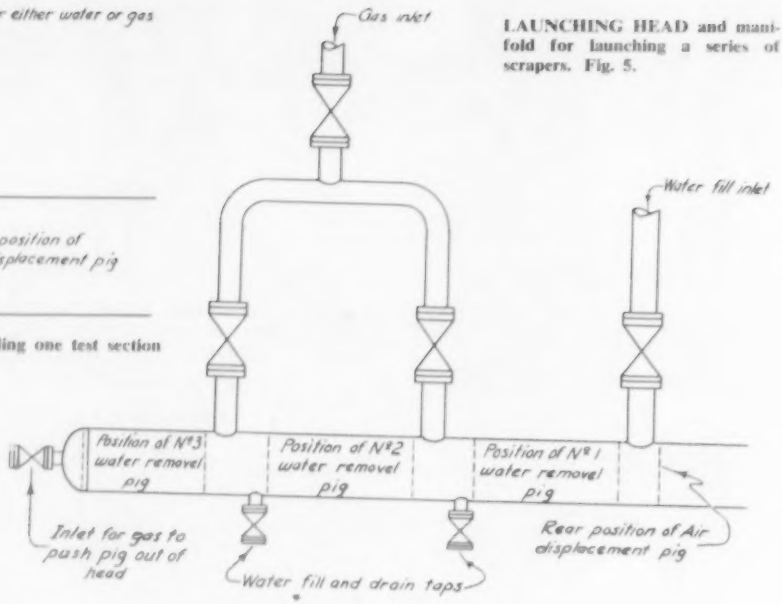
Elevation profile . . . It is important for the engineer in charge of hydrostatic testing to have a detailed profile of the line, because in crossing mountainous country it might be necessary to very carefully sectionalize the line in order to subject all parts of the test section to an adequate pressure without overstressing the low end of the line because of the water head and to select adequate equipment to handle filling and pressurizing of the line.

Altimeter readings along the right-of-way should be used by the engineer to plot the expected static pressures against the footage of the line. A volume scale can also be superimposed on the footage scale in order to provide quick estimates of water volume required to fill the line to any point.

The plot should also indicate exact locations of block valves, welding ells, pipe bends, pig traps, water sources and water-disposal facilities. With all of this information readily available, the engineer in charge is in a position to determine the best way of sectionalizing the line for hydrostatic testing


Inlet for either water or gas
Inlet for gas to push pig out of head
Position of Water displacement pig
Rear position of Air displacement pig

LAUNCHING HEAD (above) equipped for filling one test section only. Fig. 4.


Gas inlet
Water fill inlet
Position of N°3 water removal pig
Position of N°2 water removal pig
Position of N° 1 water removal pig
Inlet for gas to push pig out of head
Rear position of Air displacement pig
Water fill and drain taps

LAUNCHING HEAD and manifold for launching a series of scrapers. Fig. 5.

and deciding on the best sequence for testing the sections.

Hydrostatic-Test Procedures

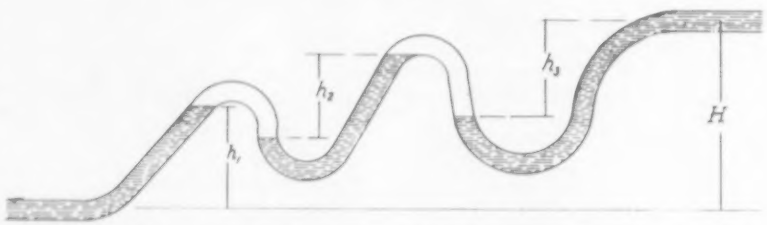
The section of line to be tested, which may be as long as 50 miles but preferably shorter in order not to cause excessive wear of the rubber cups on the pig, is prepared for test by welding the heads or traps and manifolds on each end of the line. Before the head is welded to the end of the line where the water is to be introduced a pig of the multiple-rubber-cup type is placed just inside the line and another inside the head so positioned that the water inlet is between the two pigs. Water is pumped into the line with the fill pump pushing ahead of it the pig which displaces the air from the line through the blowoff at the far end.

Sometimes in filling a line passing through mountainous country the water pressure required becomes greater than that computed for the observed difference in elevation. One explanation given is that the pig with a water column behind it may coast down a hill faster than the water fill rate resulting in an air trap at the crest of the hill if there is entrained air with the water. A series of such traps makes the elevation head pressures of several hills additive and the fill pressure may become greater than the discharge pressure of the pump. This condition is shown diagrammatically in Fig. 6.

Eliminate Entrained Air

To avoid such trouble a fill pump with a maximum discharge pressure well above the maximum elevation head pressure should be used and care be taken to eliminate air which could become entrained with the water when filling the line. Air may be introduced if the water to the fill pump contains bubbles of air or if the supply of water is inadequate and the pump sucks in air with the water.

After the test section is filled with water as indicated by the pig entering the receiving head, the pressure is brought up to the maximum discharge pressure of the fill pump. At this stage a high-pressure fill pump is an advantage in saving time on the subsequent pressuring phase of the test especially if some air is also in the line with the water. A small amount of air in a line under test does not appear to create any problem or hazard. If a break occurs the water has so much inertia that no violent action occurs at the scene of the break.



ENTRAPPED AIR causes pump to operate against heads h_1—h_2—h_3 instead of against H as would be the case if the line were completely filled. Fig. 6.

Pressurizing the line . . . With the pipe under pressure obtained with the fill pump, the pressure is further increased to the test pressure. Any leaks or breaks are found by patrolling the pipeline right-of-way. An airplane has been used effectively in making the initial patrol.

Most failures during hydrostatic tests occur in the longitudinal weld, usually causing up to about 4 ft. of the seam to open. At the time of a break no particularly violent action takes place other than that a stream or sheet of water is ejected at high velocity. Fig. 7 shows a typical break.

After any leak that develops has been repaired, the line is again pressurized to the test pressure, either compressing the air that was drawn in at the break or venting the line at high points. This test pressure is held for a minimum of 8 hours but is usually held for at least 24 hours since experience has shown that some breaks will not occur in an 8-hour period but will show within 24 hours.

Water removal . . . On completion of the pressure test the water is displaced from the section by injecting gas into the line behind the second pig placed in the head. The rate of pig travel is governed by controlling the flow of water out of the discharge end.

Referring to Case 1 in Fig. 8, the amount of gas wasted can be held to a minimum if initially the test sections are selected so that a block valve can be placed at the downstream end of the section after it is tested and the water removed; then in displacing the water from the next section the gas can be shut off at the block valve so that only the gas in the section under test need be vented at the time of the tiein.

Referring to Case 2 in Fig. 8, if full-opening valves are used, it is possible

MAJORITY of breaks that occur during testing are of the split-seam type as shown on this 30-in. line. Fig. 7.

to put the pigs in the upstream end of the section to be tested and then permanently connect this section to the line just downstream from the full-opening block valve of the preceding section. Then the test section can be filled with water through a tap between the pigs and, after testing, the water displaced by allowing gas to flow through the block valve. With this procedure it is not necessary to vent any gas.

Drying . . . From laboratory tests it has been determined by the authors that when the wall of a pipe has been thoroughly wet and then scraped free of all visible water with a rubber plunger that the water retained by the damp wall is of the order of 0.001 lb. per sq. ft. Data obtained in practice indicate this ultimate degree of dryness may be approached in displacing the water with a pig under favorable circumstances.

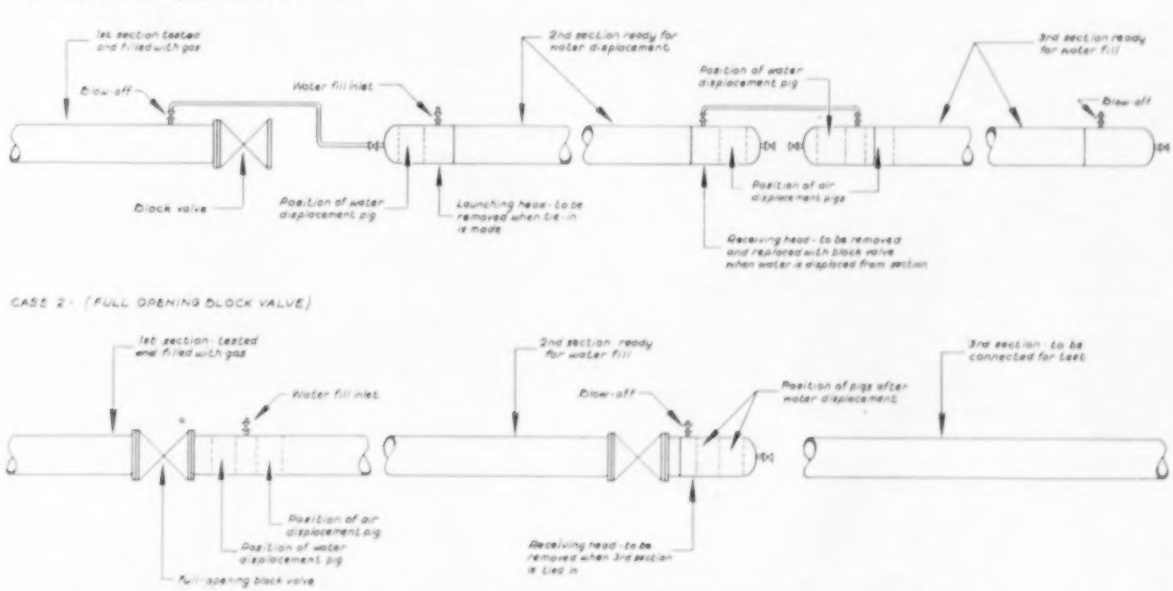
To do this, two pigs should be run together and each pig should have at least three rubber cups. In addition the section of line should be 30 miles or less so that the wear of the cups is not enough to reduce their "squeegee" efficiency. The pipe should have long-radius bends and have no obstructions where the rubber cups on the pigs could be damaged or deformed. Also, the pigs should be kept in continuous motion during the water-displacement run.

Under ideal conditions with the hydrostatic test made on a 24-in. pipeline divided into sections totaling 300 miles, the average amount of water left after the water-displacement pig run was of the order of 0.02 lb. per sq. ft. of pipe-wall area. The ultimate degree of dryness was only approached after three more separate pig runs were made through each 60-mile section of this line.

One difficulty sometimes encountered in making additional pig runs is that the gas pressure behind the pig may build up considerably greater than that normally required to produce the differential pressure necessary to move the pig when it is not obstructed. When the resistance is removed by the pig clearing the obstruction or reaching the top of the hill the pressure behind it can cause the pig to travel at high speed for a considerable distance which may result in damage to the pig or rupturing of the pipe at a short radius bend.

Pressure Test Section

If the nature of the test section is such that there is a likelihood of a pig encountering an obstruction, consideration should be given to pressurizing the test section with gas before the second or subsequent pig runs are made. Then, if the pig "hangs up" during the run and breaks free when the differential pressure becomes high, the gas ahead of the pig will act as a


CASE 1 - (BLOCK VALVE, BUT NOT FULL OPENING)
1st section tested and filled with gas
Blow-off
Water fill inlet
2nd section ready for water displacement
Position of water displacement pig
3rd section ready for water fill
Blow-off
Block valve
Position of water displacement pig
Launching head - to be removed when tie-in is made
Position of air displacement pigs
Receiving head - to be removed and replaced with block valve when water is displaced from section
CASE 2 - (FULL OPENING BLOCK VALVE)
1st section tested and filled with gas
Water fill inlet
2nd section ready for water fill
Blow-off
Position of pigs after water displacement
3rd section - to be connected for test
Position of air displacement pig
Position of water displacement pig
Full opening block valve
Receiving head - to be removed when 3rd section is tied in

TO MINIMIZE the quantity of gas vented during testing operations, the line should be sectionalized by one of the methods shown here. Fig. 8.

cushion to reduce its speed and the distance it travels.

The equation below can be used to calculate this distance.

$$\Delta d = d\left(\frac{P_1 D}{P(D-d) + P_1 d} - 1\right) \quad (1)$$

where:

Δd = distance pig travels after clearing obstruction before pressure is equalized.

d = distance of obstruction from upstream end of section.

P_1 = pressure of gas behind pig at time it breaks free of obstruction.

D = length of test section.

P = initial pressure of gas in section when pig is launched.

The distance, d, for the pig travel to be a maximum can be obtained by differentiating Δd with respect to d and equating the resulting expression to zero and solving for d. In this case,

$$\Delta d_{max} = D\,[(PP_1)^{1/2} - 1]/(P_1 - P) \quad (2)$$

In the above equations it is assumed that no differential pressure across the pig is required to keep it in motion after it breaks free of the obstruction.

Pressurizing the line before making additional pig runs will increase the amount of gas wasted and may increase the over-all cost of hydrostatic testing. Therefore, pressurizing does not appear to be warranted if the test section does not contain places where the pig could potentially become stuck; this further emphasizes the need for designing the line for pig running.

Avoiding hydrate blockages . . . If the favorable conditions exist as mentioned previously for displacing the water with one pig run after hydrostatic testing, it has been the experience of several companies that the water left in the pipe is not sufficient to cause operating difficulties due to line blockage by hydrate formation. Even if the line, subsequent to a hydrostatic test, is operated at a pressure and ground temperature at which hydrates will form, the amount of hydrate formed is not enough to seriously restrict the flow of gas, provided of course that the gas is sufficiently dehydrated that it does not supply additional water to further increase the quantity of hydrate.

Although hydrates may not cause difficulty in the main line after hydrostatic testing, water may condense from the gas at offtake pressure regulators and form hydrates, blocking the offtake line. To prevent such trouble provision should be made to heat the regulators or to inject methyl alcohol when a freezeup occurs.

Sometimes residual water draining into a low spot in the line will cause formation of a hydrate plug after testing. When the line profile indicates the possibility of such an occurrence a siphon tap should be put in at the low spot to drain off water and forestall trouble. Also, if a freezeup does occur, it may be removed by the injection of 1 or 2 bbl. of methyl alcohol where it can flow down to the hydrate plug.

Climatic conditions . . . Hydrostatic testing has been successfully conducted in very cold weather when the atmospheric temperatures have been as low at 5° F. below zero; however, no testing has been done with ground temperatures at pipe depth below freezing, although ground temperatures have been as low as 35° F.

It is the consensus of several companies that have done a good deal of hydrostatic testing that it would not be feasible to hydrostatically test a pipeline with a ground temperature below 32° F.

Cost of Hydrostatic Testing

The cost of hydrostatic testing will vary considerably depending mainly upon the length of line and the adequacy of the equipment used in testing. Costs have been reported by some companies of from 10 to 50 cents per foot of large-diameter pipelines. Inadequate equipment and failure to design the pipeline so that it can be easily tested are very important factors in making the cost of hydrostatic testing high.

The argument is offered that hydrostatic testing delays completion of the line, and the loss of revenue makes the cost of testing high. It is believed that by adequately planning the testing as part of the pipeline construction as described previously that there will be no significant delay and, in fact, in many cases less delay will be encountered than if a gas test were made.

Acknowledgment

The authors thank the following concerns which supplied much of the information given in this paper and also M. J. Binckley, of Southern California Gas Co., who reviewed the paper and made many helpful comments and suggestions: Niagara Mohawk Power Corp., Oklahoma Natural Gas Co., Southern California Gas Co., Southern Counties Gas Co. of California, Texas Eastern Transmission Corp., East Ohio Gas Co.

Reference

1. "Economics of Internally Cleaning Gas Lines During Operation," by E. T. Robinson, Jr., The Oil and Gas Journal, July 27, 1953.

BOOKS

1953 OIL AND GAS-WELL DRILLING STATISTICS. By Robert L. Alkire. Published by Department of Natural Resources, State of Ohio, Orton Hall, Ohio State University, Columbus 10. 53 pp., free on request.

Here's a summary of oil and gas-well drilling in Ohio in 1953 as compiled by the division of geological survey of the state's Department of Natural Resources. Part 1 presents the statistics of Ohio's 1953 drilling, well completions, oil and gas production, reserves, gas-consumption data, and crude-oil prices. Part 2 is a special section on the development of underground storage in Ohio, written by two Ohio gas company executives.

PLANT ENGINEER'S EASY PROBLEM SOLVER. By Louis J. Murphy. Published by Conover-Mast Publications, Inc., Book Division, New York. 355 pp., $6.

Designed as a time-saving text for practical engineers in all fields, this book presents more than 200 working charts and tables for application to a wide range of engineering problems. Its 15 sections cover the problems of plant engineering from metal working to maintenance, and offer simple solutions based on accurate, easy-to-use charts, tables, formulas, and scales. Simply arranged and indexed for quick reference, this book should be a useful addition to many engineers' reference shelves.

OFFSHORE SUMMARY. By Emory N. Kemler and Edward W. Rosencrants. Published by Summary Reports, P.O. Box 176, Spring Park, Minn. 410 pp.

Both design and operating engineers engaged in offshore oil operations will find this summary and review of general information about offshore operating techniques very helpful. The book—a compilation of up-to-date information, patent abstracts, and a complete bibliography—was designed as a guide to the newest information available about this fast-growing field. Because offshore operations involve far more than petroleum engineering techniques alone, much of the book is devoted to meteorology, oceanography, fluid mechanics, marine engineering, and soil mechanics. More than 240 patents related to various phases of offshore operations are abstracted, and in many cases the patent is illustrated. The extensive bibliography covers papers, articles, and books published in various offshore-related fields in the past few years. In short, this summary is complete, concise, and up-to-date in its treatment of one of the most rapidly growing of all oil-operating techniques.

PETROLEUM MICROBIOLOGY by Ernest Beerstecher, Jr. Published by Elsevier Press, Houston, 375 pp. $8.

A scholarly examination of a growing field representing a merger of bacteriology and petroleum engineering, this book represents an important new contribution to the petroleum literature. The author describes the science of petroleum in terms of microbiology that will be intelligible to all the oil professions. Following an introducton tracing the development of his subject, Beerstecher traces its expansion into the fields of petroleum exploration, production, and manufacturing. It is a practical treatise, invading a field of research about which too little has been published. The author's basic academic affiliation as associate professor of biochemistry at University of Texas affords him freedom to write on his subject without fear of violating company policy. The book is amply illustrated and well printed and should find a place with every petroleum library.

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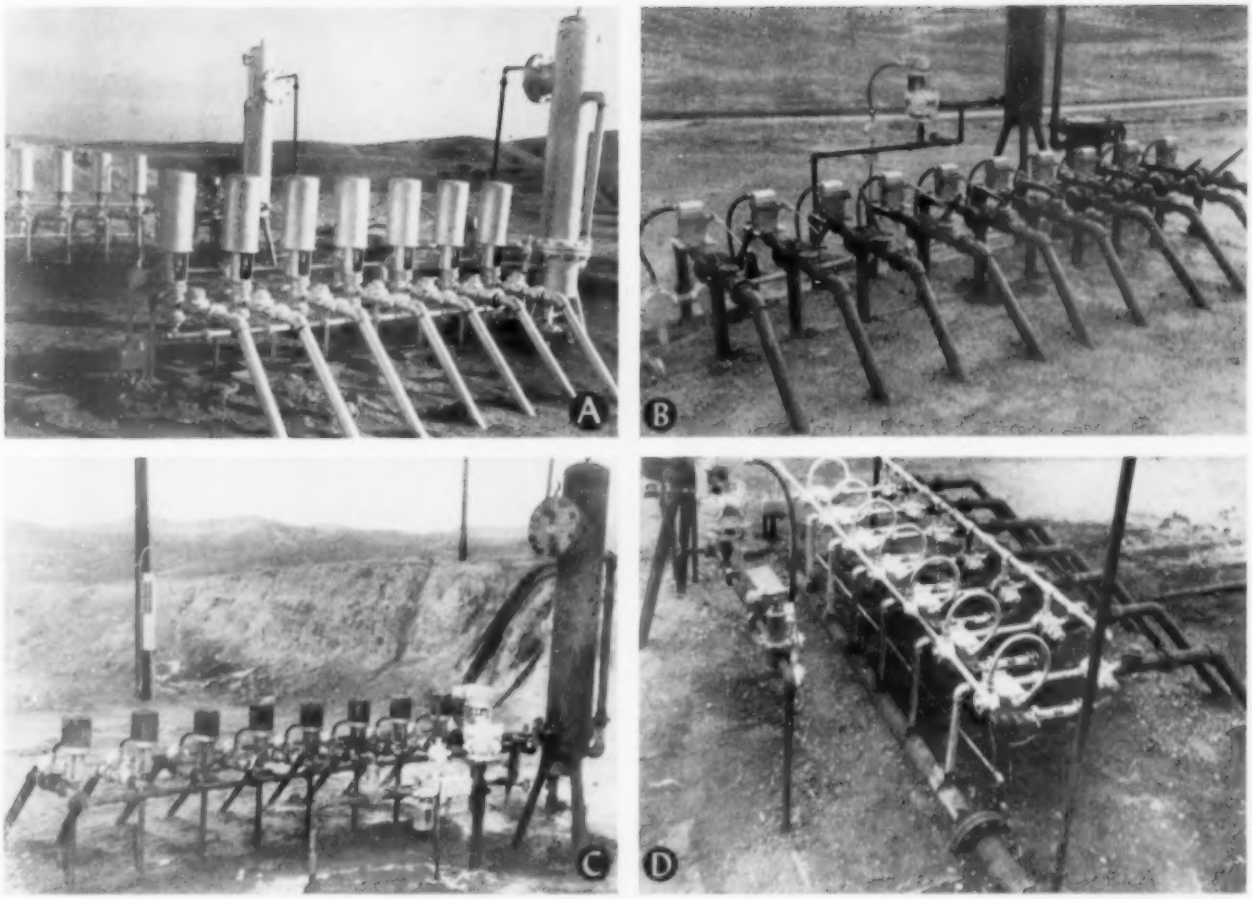

Fig. 1—A variety of devices are being employed for operating the three-way valves which determine whether a well's production is to be tested or combined with other wells served by the station. "A" shows a setting with electric-operated hydraulic valves; "B" and "C," two types of shaded-pole valve operators; and "D," a seven-well setting where air cylinders operate the valves in response to solenoid-operated pilot valves.

Shell converts old Coalinga leases to

Automatic Sampling and Gaging

. . . at a cost of approximately $300 per well

by D. H. Stormont
West Coast District Editor

AUTOMATIC controls designed to duplicate many functions performed manually by pumpers have been installed by Shell Oil Co. at approximately 465 small producers on its East Coalinga properties in California.

For the most part the wells involved were 20 to 30 years old. Their volume of production was such that for a reasonable payout to be had, any new facilities installed would have to be relatively inexpensive.

Through improvising and shop fabricating the control equipment from component parts readily available in the open market, cost of converting to automatic gaging and sampling was held to approximately $300 per well. It is anticipated that reduced operating and maintenance costs will result in this outlay being returned several-fold before the properties are abandoned.

Condition of the 100 to 250-bbl. tanks at the already existing manual meter stations had much to do with the decision to install automatic controls. The average length of service of 48 corrugated tanks needing replacement was 30 years; 25 bolted steel tanks were in poor condition and would have to be replaced in the next 5 years.

The automatic meter settings are performing satisfactorily and with an accuracy well within accepted limits. In many cases, the results are more consistent than were those obtained by manual gaging. Because of the need for economizing, however, the East Coalinga settings do not contain some

Fig. 2—Metering is performed by conventional registers which employ a cam-actuated electrical contact to energize nearby pole-mounted counters. Viewing meter is Amos Cook, Shell mechanical engineer.

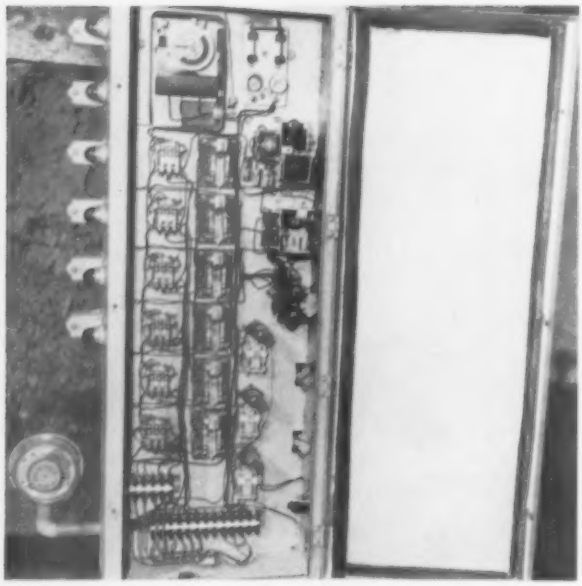

Fig. 3—Interior of a pole-mounted panel which serves a six-well meter setting. The panels were shop fabricated and wired from readily available component parts.

refinements incorporated in the Shell trap farms at its Brea-Olinda properties.[1]

Functions performed . . . The approximately 465 wells, all on fee-owned properties, are produced through 42 automatic stations. Each setting handles from 7 to 20 wells, with most installations having either 7 or 14. Wells produce under rod-pump pressure to the stations through flow lines 500 to 2,500 ft. long.

Functions performed by each station are:

1. Wells are automatically switched from the group rundown manifold to the test manifold in a present sequence which varies from 7 to 16 days in accordance with the number of wells connected to the station. While undergoing test, for either 12 or 24-hour periods, the output of each well is measured and recorded on resettable electric counters.

2. A sample and cut of each well, obtained generally at 0.1-bbl. increments, is taken at intervals of 21 to 30 days depending on number of wells in the manifold.

3. The sequence of metering can be interrupted at any time to manually test a new well, or any well connected to the manifold on which a special test is desired.

A desirable feature of the remodeled flow stations is that rundown and test tanks are eliminated. All wells produce directly into central shipping stations.

Control equipment . . . Control equipment at each manifold station consists of: (1) A pole-mounted panel containing individual well production counters, indicating lights, purge timer, sample timer, and other electrical components necessary to make the operation completely automatic; (2) flow meter with a cam-actuated electrical contact; (3) flow sampling device; (4) three-way electrically operated valves; and (5) sand trap and gas boot.

The timer is an ordinary electric time switch which makes and breaks an electrical contact once each 24 hours, in the case of a seven-well manifold. Where 14 wells or more are handled through a manifold the frequency is once each 12 hours. The following deals with a seven-well manifold.

Switching . . . The time switch closes a contact through a timer and a slave relay, which in turn actuates a 7-point stepping switch whose contact energizes the solenoid valve relay. The three-way valve relays are energized in sequence from the stepping relay for a 24-hour period; this sequence then is repeated every 7 days.

When a particular three-way solenoid valve is energized, flow from the well is diverted from the group rundown manifold to the test manifold. The well's flow then is through a sand trap, gas boot, meter, and sampler.

As is shown in Fig. 1, several types of mechanisms are used for operating the three-way valves. At some manifolds electric-operated hydraulic valves are used (Fig. 1A). At other stations, shaded-pole motor valve operators perform this duty (Fig. 1B, 1C). At still other manifolds, valves are operated by air-cylinders in response to solenoid-operated pilot valves (Fig. 1D). In the latter case 60-psi. air is obtained from small compressors located nearby.

Another type being investigated is a multiport valve which automatically and in sequence permits each well to switch into the test manifold. In the meter being tested seven inlets and one outlet connection are offered.

Metering . . . As the fluid from a well undergoing test passes through the meter its register revolves and indicates the fluid flow (Fig. 2). Driven by the meter register is a cam-actuated electrical contact which, when closed, energizes the electric resettable counter through time and slave relays. When the contact opens after a preset period of time, the counter coil is deenergized. By means of this arrangement, the individual well production is recorded on the panel-mounted electric counters.

"The automatic meter settings are performing satisfactorily and with an accuracy well within accepted limits. In many cases results are more consistent than those obtained by manual gaging."

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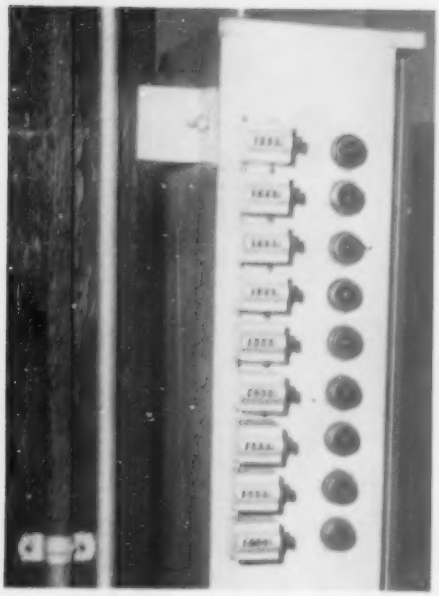

Fig. 4—Simple electric resettable counters record the production of each well in 0.1-bbl. increments during its test period.

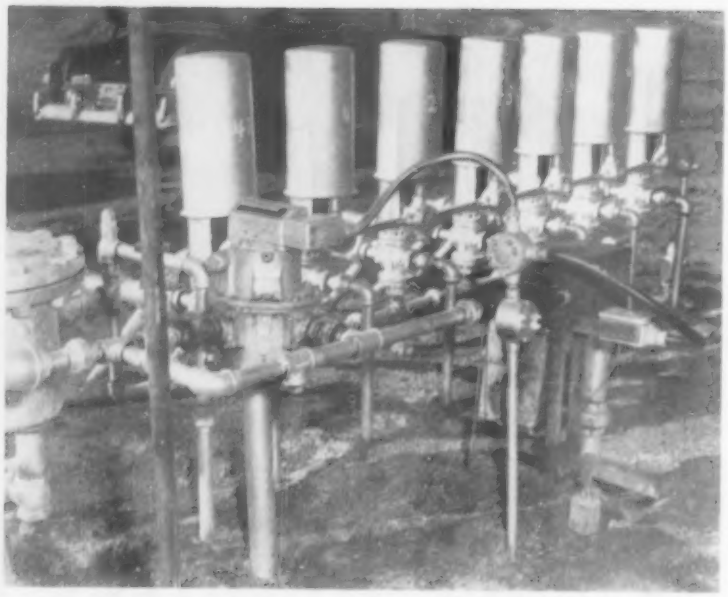

Fig. 5—Shop-made sampler automatically samples fluid of every third well undergoing test. A 1-gal. can is used to collect sample, which accumulates in response to controls actuated at 0.1-bbl. increments.

Sampling . . . The timer which regulates well switching also actuates a 24-point stepping switch to energize the automatic sampler coil at the manifold (Fig. 3). The switch is actuated once each 24 hours and steps one position each day. The stepping switch contacts, however, are connected so the sampler coil will be energized only from each third well in sequence. Or a flow sample thus is obtained only every third day.

This frequency of sampling, for each well about once every 3 weeks, has been found sufficient for these stabilized East Coalinga wells. And since a 2-day lapse occurs after the completion of each sample, the pumper does not have to visit every manifold daily.

The sampler coil has a latching relay and indicating light connected in parallel with its contacts. The light, mounted on the control panel alongside the corresponding well counter, remains on until it is manually released by the pumper (Fig. 4). By looking at the group of lights the pumper thus can determine which well has been sampled even though he arrives at the station after the well has been returned to the run-down manifold.

In order to obtain a representative sample regardless of quantity of well production, a sample timer is incorporated in the circuit and a switch provided so a sample can be obtained by increments of flow (0.1 bbl.) or by increments of time. The first-mentioned method is used almost entirely at the time being.

An additional provision is the inclusion of a purge timer in the circuit so that the test line is automatically purged after each test. By means of this control, all fluid from the previous test is removed before the next sample is started.

Sampling for the most part is carried out with commercial well samplers, using a 1-qt. container (Fig. 2). A shop-made sampler devised by Shell mechanical engineers who were responsible for the design of the entire installations, likewise is giving excellent service (Fig. 5).

This sampler consists of (1) a short section of 2-in. square tubing inserted in the test line downstream from the meter; (2) a ¾-in. tube containing a vertical slot ⅛-in. wide and 2 in. long, passing vertically through the center of the square tubing; and (3) a smaller tube having a similar vertical slot is contained inside the ¾-in. tubing and provision is made to rotate the inner tube with respect to the ¾-in. tube.

Normally the slots are misaligned, through use of a spring to position the inner tube against a mechanical stop. When the sampler solenoid is energized, the slots are aligned. During this short period of alignment a small amount of fluid passes from the test line and drops into a 1-gal. sample can.

Manual testing . . . In order to be able to run manual tests when desired, an additional seven-point stepping relay is provided with switching to allow for testing of any well in the manifold. Provision also is made for obtaining a sample if such is desired. Switching to manual testing is done by turning the sampler stepping switch and the well stepping switch from automatic to hand position. When the manual testing has been completed, it is necessary to turn the switches back to the automatic position.

Operation of a 14-well manifold is the same as for the 7-well except that wells enter the test manifold for a 12-hour period. Also they are sampled every other day instead of every third day.

To assure that the individual meters are functioning accurately, periodic checks are run with portable test equipment. Principal item of the test equipment is a sealed measure which has been tested and certified as being a 1-bbl. capacity.

Reference

1. "Shell's Push-Button Trap Farm," The Oil and Gas Journal, October 12, 1953, p. 148.

"A desirable feature of the remodeled flow stations is that rundown and test tanks are eliminated. All wells produce directly into central shipping stations."

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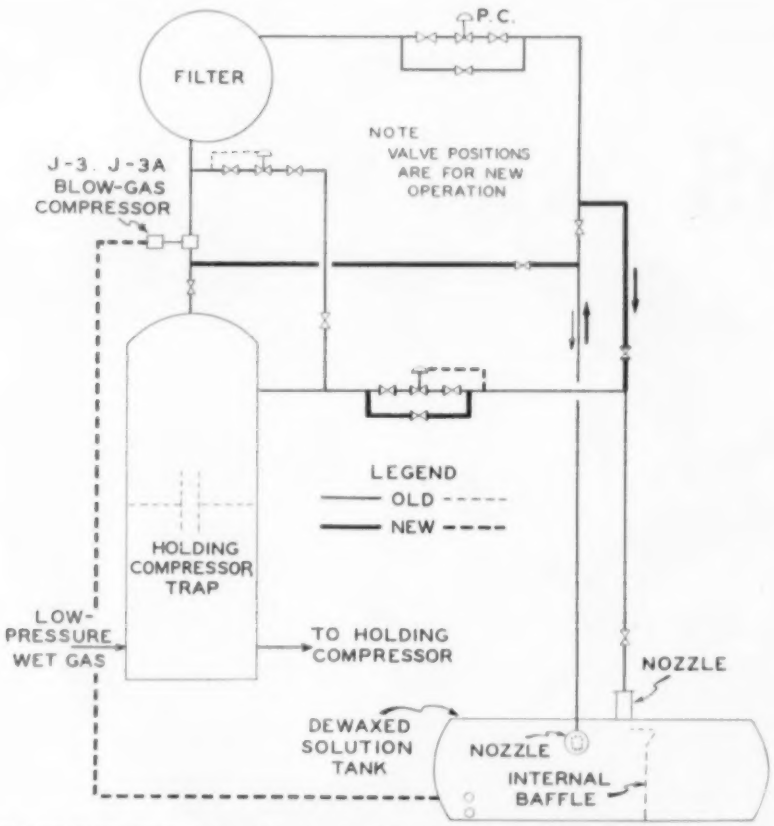


REARRANGEMENT of the piping introduced low-temperature, moisture-free blow gas to the filters. This eliminated the possibility of ice spots forming on filter cloth and limiting capacity.

Piping change raises capacity

by F. Lawrence Resen

MODIFICATION of blow-gas compressor suction piping at the holding compressor trap and dewaxed solution tank at a propane lube plant resulted in an assured supply of dry, cold, filter blow gas. This, in turn, increased the plant capacity since the filters limit the capacity of the propane lube plant a large proportion of the time.

Filter blow gas was previously obtained by taking suction with two 125-hp. compressors on the holding compressor trap. The holding trap actually serves as a knockout drum for two sets of compressors—blow gas and holding.

The trap is vertical and is separated into two connected compartments by a horizontal baffle in which is a 24-in. length of 10-in. vertical pipe. Warm low-pressure wet gas from the low-pressure gas washer enters the bottom section of the drum and usually flows across the drum to the outlet and thence to the holding compressor. Cold, dry gas from the dewaxed solution tank enters the top compartment and flows out of the top of the drum to the blow-gas compressors—J3, J3A.

As long as the quantity of gas from the dewaxed solution tank would exceed quantity flowing to the blow-gas compressor, the blow gas, or filter gas, is dry and excess flows downward into the bottom compartment and out to the holding compressor. This is the desired operation.

However, when the quantity of gas from the dewaxed solution tank was less than the amount of gas needed for blow gas, the wet gas would flow upward from the bottom compartment to make up the deficit. In this way, wet gas would reach the filters and foul them with ice or hydrates.

Changes made included the rearrangement of piping so that the suction of the blow-gas compressors would be picked up from the top of the cloudy compartment of the dewaxed solution. The line from the top of the trap to the suction of the compressors was blanked off. A pressure regulator was installed on the vapor line from the cloudy compartment to the holding trap, which insured a supply of blow gas for the filters.

These minor changes have resulted in low-temperature, moisture-free blow gas being furnished to the filters, thereby eliminating possibility of ice spots forming on the filter cloth and limiting capacity.

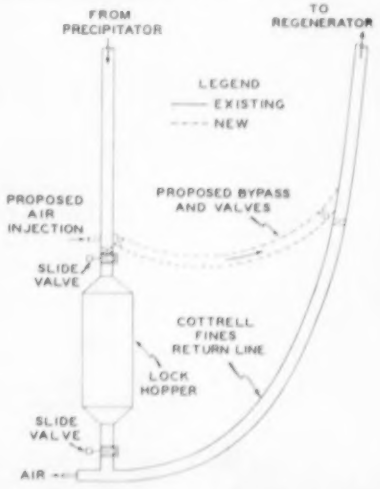
Method suggested by Joe F. Presnall, filterman; courtesy Humble Oil & Refining Co., Baytown, Tex.

Bypassing trouble . . .

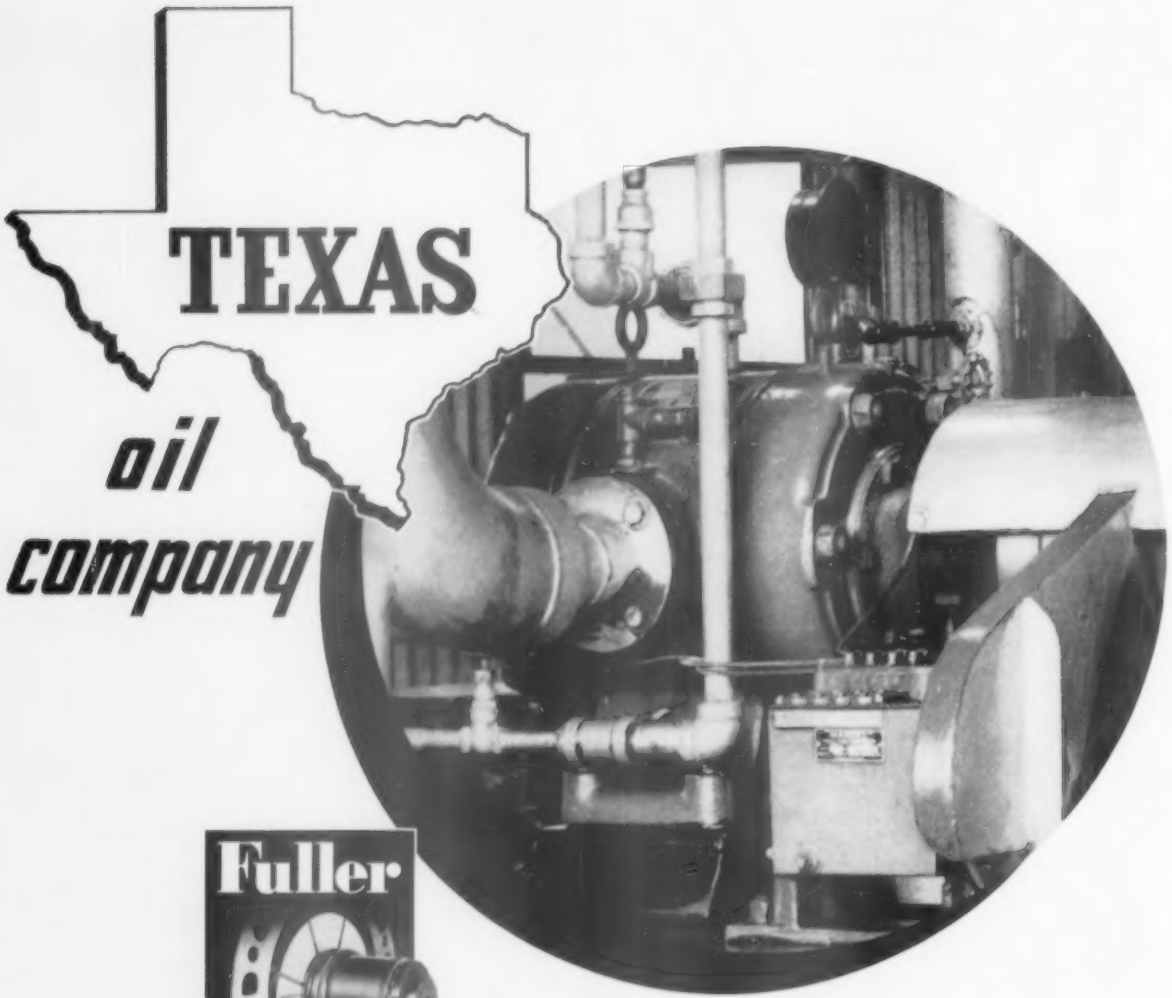
A BYPASS line in the fine-catalyst return system on a fluid cracking unit can be used to divert flow of catalyst from the lock hopper, permitting repairs to be made when necessary.

Such a bypass will allow the unit to maintain regular operating conditions which would not be the case if the fine-catalyst recovery system had to be blocked off.

In one type of system, fine-catalyst particles are removed from the flue gases at the cracking units by means of electric precipitators. The fine catalyst falls into large hoppers below the precipitators and flows down into a standpipe. This catalyst is then blown back up into the regenerator through a 16-in. fines return line. Several slide valves and a lock hopper are located in



BY ADDING a bypass line between the fines return and the precipitator standpipe, repairs are simplified.



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the bottom of the standpipe to help regulate the flow of fine catalyst.

When the cyclone separators in the regenerator become worn, an abnormal amount of catalyst is carried over to the precipitators. This causes high-catalyst flow rates through the precipitators standpipe and the fines return line. This increased rate, in turn, causes excessive wear on the slide-valve plates.

When this occurs, it is necessary to block off the standpipe and install new slides in the valves. Shutting off the fines line results in reduced regenerated-catalyst standpipe pressure and the unit is often seriously upset.

A bypass was proposed to provide protection against upsetting unit operations in the event it is necessary to repair precipitator slide valves during a run. The bypass installed consists of a line running between the fines return line and the precipitator standpipe, tying in just above the lock hopper and slide valves. Appropriate valves were included in the bypass, fines return line, and precipitator standpipe to isolate the lock-hopper unit as required. An air-injection line was installed in the standpipe opposite the bypass line for carrying the catalyst particles to the regenerator.

Method suggested by Oscar C. LeJeune, first helper, cracking and hydro department; courtesy Esso Standard Oil Co., Baton Rouge, La.

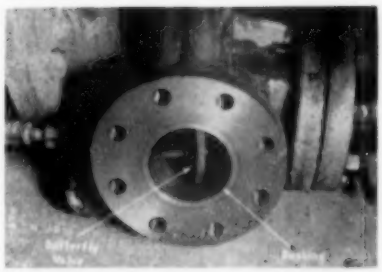
Pulls liners easier

A SIMPLIFIED method of pulling liners from two-piece forged-steel cylinder blocks can be followed by use of a shop-fabricated clamp.

The clamp consists of two sections of 4-in.-wide strap iron with hemispherically shaped center sections These fit around the exposed portion of the liner and are bolted together. In two-piece blocks, the liner extends in one piece into both of the blocks. It is relatively easy to remove the liner from one of the blocks, since the other block can be used to pry upon. With one of the pieces removed, half the liner is left exposed. It is this half which is difficult to remove.

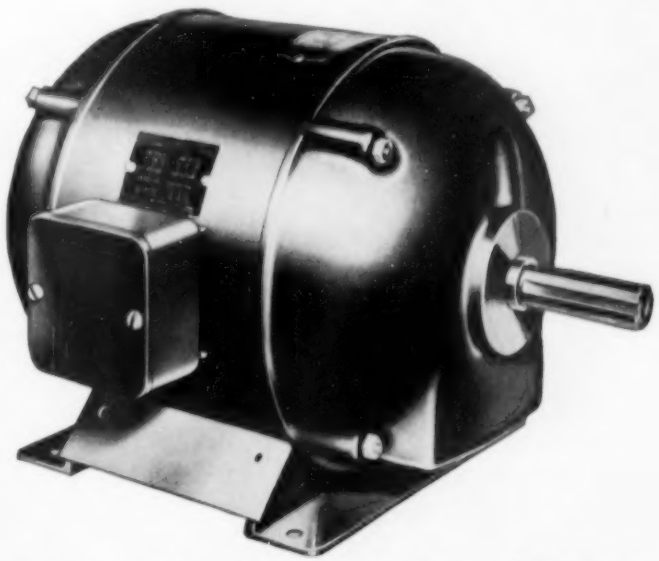
Once the clamp has been tightened around the liner, jacks can be placed beneath it and used to force the liner out of the block with comparative ease.

Clamps can be shaped to fit practically any size liner used in these blocks. Such a clamp was devised by J. A. Jackson, Southern Minerals Corp., Stratton plant, South Texas.



New seating surface

INSTALLATION of stainless-steel bushings to provide new seating surface for butterfly valves on turbines



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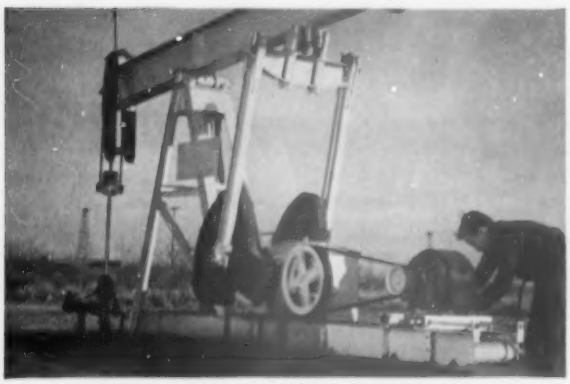
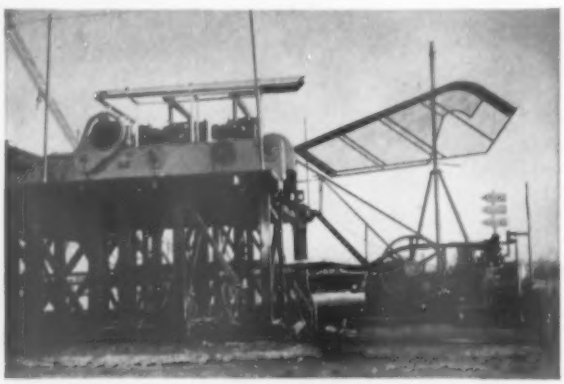


INDIVIDUALLY DESIGNED FOR THE LOAD it has to carry, the QD sheave on this pumping job will probably outlast the equipment with which it is used. Worthington first built the famous QD to the specifications of oil production men. It's now accepted as *standard* for all kinds of duty.



THE EXTRA GRIPPING ABILITY of the QD sheave is especially important on drilling rigs like this. Its tapered cone friction grip withstands heavy shock loads without slipping. Servicing rigs like this is easier, too, because the QD can be mounted and dismounted faster.

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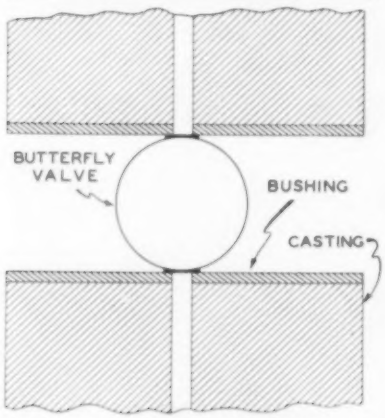


SURFACING the castings with stainless-steel bushings gives the desired longer life without replacement.

gives longer life to the unit without the expense of replacing the entire casting.

On the particular turbines in question, overspeed valves are installed in inlet side to provide for closing off steam supply when overspeeding occurs and when the turbine is out of service. Leakage around the valve can result from pitting or erosion of the seating surface, and positive closing is not possible.

However, a new seating surface may be inserted in the casting by boring the valve body and pressing the bushing into the inlet nozzle of the steam chest. With the bushing having been first machined to the original inside dimensions, the butterfly valve can then perform as designed.

Method suggested by George B. Smith, machinist, courtesy Humble Oil & Refining Co., Baytown, Tex.

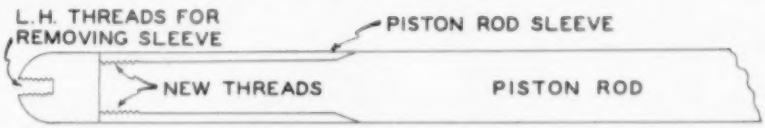
Simpler sampling

TAKING of samples at reduced temperatures can be greatly simplified through use of a permanent cooling bath alongside of the vessel being sampled.

The bath may be constructed from a section of large diameter pipe, with the bottom end sealed off and a cap provided for the top. Tubing may be coiled within the bath and appropriate fittings welded at the top and bottom to allow the coil to be connected to incoming and outgoing lines.

When taking samples, ice and water are placed in the bath. Then the sample is circulated through the coil and collected from the outgoing line. Provisions may be made for first purging the sample line before turning the sample into the coil.

Modified sleeve cuts overhaul time

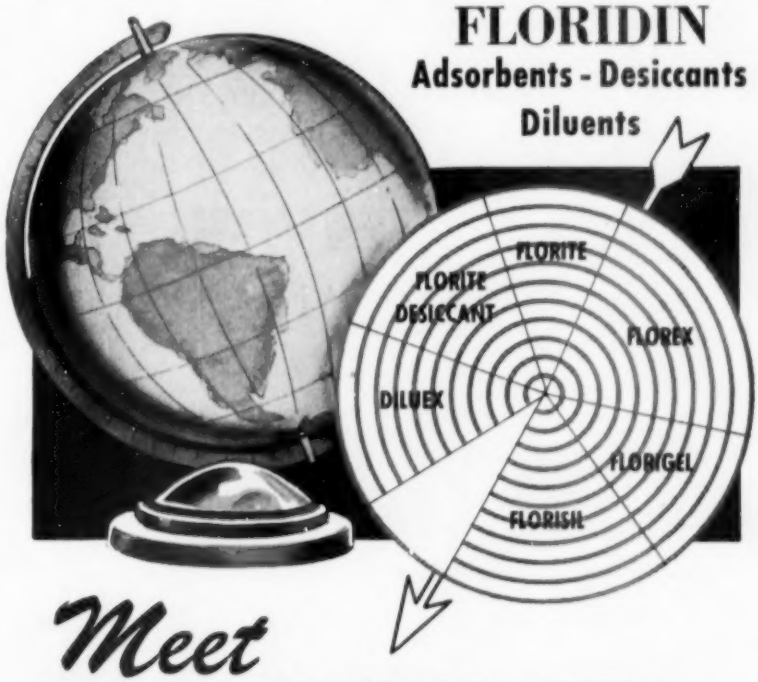


TAPPING internal threads into the bottom of the piston-rod sleeve permits the piston to be withdrawn readily to any position.

OVERHAULING of compressors may be simplified and improved with the use of a modified piston-rod installation sleeve.

Such a sleeve is used with Clark compressors to protect the piston-rod threads as well as the metallic packing while the piston is being installed.

The sleeve has a bullet-nose end to spread the packing rings as the rod enters the stuffing box, and a smooth outer surface to prevent damage to the



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rings while passing through the gland. The sleeve is normally just slipped over the threaded end of the piston rod of the horizontal Clark compressors when the rods are being withdrawn or installed.

During these operations, the sleeve had no way of being kept in position while the packing was being pulled. Consequently, the packing would be frequently damaged by the rod threads. Because of this, the pistons would seldom be completely removed during semiannual inspection and cleaning of the engines. With the piston-ring grooves just barely exposed, a great deal of time would be expended in cleaning them because the cylinder-head studs would interfere with the movement of the scraper tools.

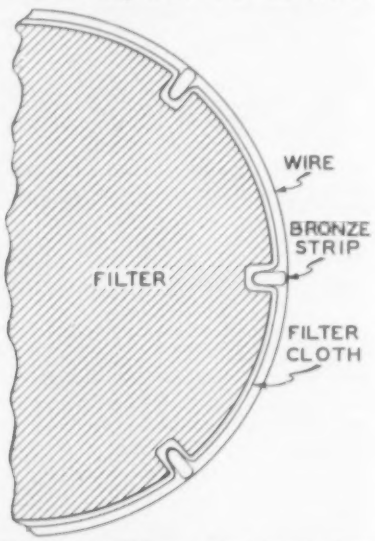
The addition of a few internal threads at the bottom of the sleeve, however, made it possible for the piston to be withdrawn to any position without damaging the packing. The internal-sleeve threads engage the piston-rod threads and thereupon hold the sleeve in position regardless of the direction of movement. Left-hand threads were tapped into the bullet nose of the sleeve to allow it to be secured or removed from the sleeve by use of a cap-screw.

Method suggested by William F. Zawatsky, machinist; courtesy Humble Oil & Refining Co., Baytown, Tex.

Exit hand-caulking

THE tedious method of caulking filter cloth with lead wire may be eliminated with the adaptation of bronze caulking strips.

In securing filter cloth on Goslin-



BRONZE STRIPS are wedged into the filter cloth and are held in place by wrapping the entire filter with wire.

Miringham filters at the methyl ethyl ketone plant, a previously followed procedure involved the hand-caulking of the cloth into grooves by the use of lead wire. Approximately 500 ft. of the wire had to be tediously and painstakingly hand-caulked into the grooves each time the filter cloth was changed.

In addition to the loss in production time during this drawnout procedure, the method was also conducive to damages occurring to the filter cloth from the caulking tools.

An improvement over the old method has been the use of bronze caulking strips, which may be easily and quickly wedged in the grooves.

Method suggested by Fred E. Davis, machinist; courtesy Humble Oil & Refining Co., Baytown, Tex.

BOOK

ROTARY-PERCUSSION DRILLING. By Emory N. Kemler. Published by Summary Reports, P. O. Box 176, Spring Park, Minn. 120 pp., $8.

This text is a summary of patents and literature relating to rotary-percussion drilling, along with a brief review of the present status of its development. More than 100 patents are reviewed and many are illustrated. The literature resume, though brief, is complete and up to date.

"SAND-FRAC" PROCESS Gets a Lift with WISCONSIN-POWERED Equipment

A Model TFD 2-cylinder Wisconsin Heavy-Duty Air-Cooled Engine operates the paddles in the two 500-gal. mixing tanks of this Dowell Twin-Tank Unit which supplies a mixture of sand and oil for use in the rapidly expanding "Sand-Frac" Process.

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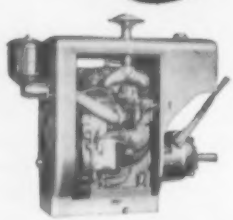

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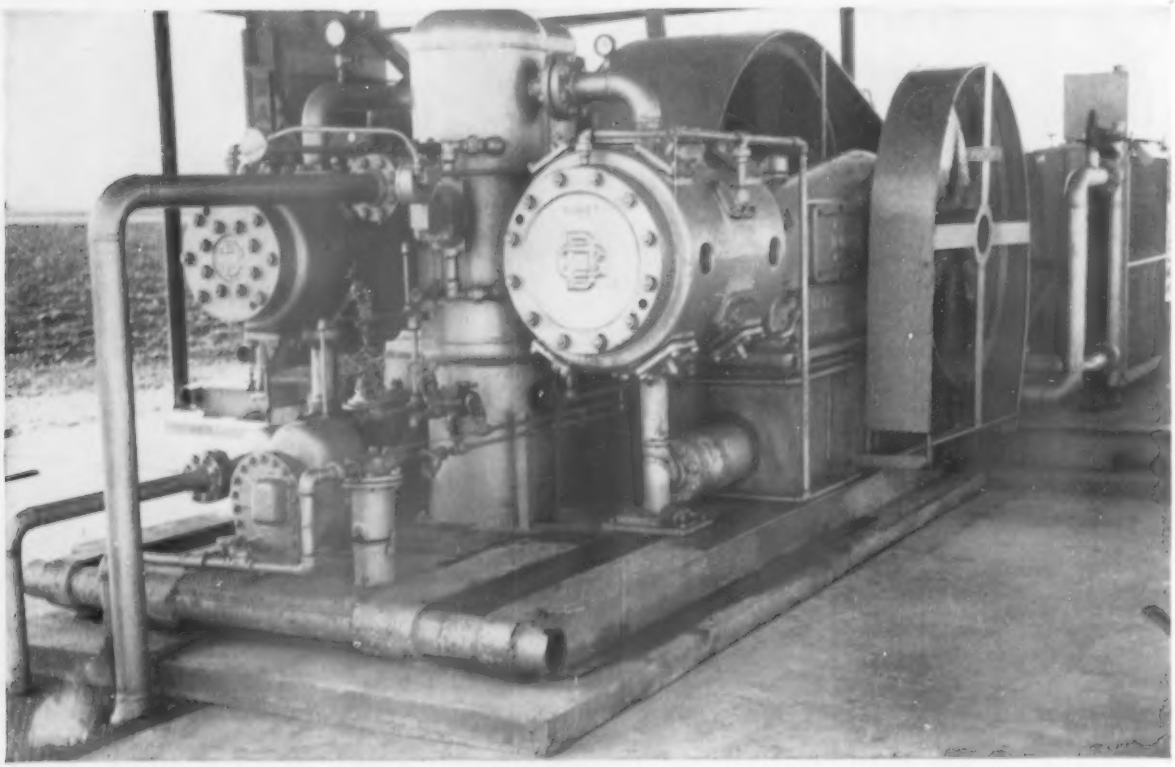

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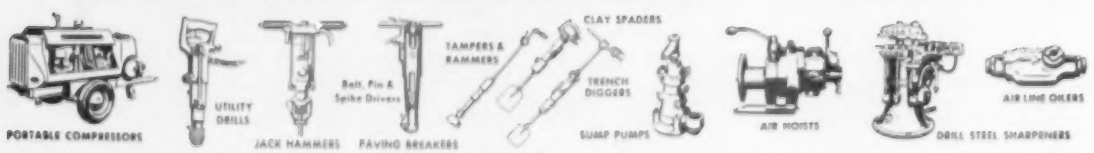

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Fluid Displacement in Linear Floods—4

by Dr. R. F. Nielsen

IF flow is not horizontal, the sin α term in our equations must remain in the fractional-flow formula, unless flow is so fast that the frontal zone is small. This is exemplified by downward displacement of liquid gas when, for simplicity, the medium is initially 100 per cent saturated by the liquid.

The fractional flow of gas is

$$f_g = F_g - (F_g k_L K / v\mu_L)[(dP_c/dx) - g\Delta\rho \sin\alpha] \quad (1)$$

where $F_g = [1 - (k_L\mu_g / k_g\mu_L)]^{-1}$, $\Delta\rho$ is liquid density minus gas density, and α is deviation from vertical (negative if x is downward). Capillary pressure is taken as increasingly positive for increasing gas saturation.

If the displacement velocity is very high, the second term vanishes and the capillarity zone is negligible. Saturation at the front is then found by drawing a tangent from $S_g = 0$ (100 per cent liquid) to the F_g curve. Average saturation behind this front is the intercept of this tangent on the $F = 1$ line.

The distance any gas saturation behind the front has traveled is theoretically proportional to the slope of the upper part of the F curve. Absolute values are obtained from the distance which the front, or any given saturation, is known to have traveled.

At a slower (and constant) velocity, if the frontal zone has attained its theoretical distribution, f_g in the frontal zone is given by the tangent from $S_g = 0$. The saturation distribution in this zone with distance in the x direction would be found by integrating Equation 1. That is, the distance Δx from S_1 to S_2 is given by the integral so obtained, from P_c at S_1 to P_c at S_2.

For **very** small values of v, Δx $(S_1$ to $S_2) = g\Delta\rho \sin\alpha\, P_c$ $(S_1$ to $S_2)$, or the saturation distribution, would eventually correspond to the shape of the capillary pressure curve with the pressure units converted to "head" of liquid in the presence of gas.

Author is associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

Fluid Displacement in Radial and Pattern Floods

In linear flow, there is generally a zone at the "front" in which saturation distributions are largely governed by capillary forces, and a trailing zone in which viscosities and relative permeabilities largely determine the saturation-distance relations and their change with time.

Extent of the frontal zone is often negligible compared to the system. Calculation of the width of this zone is the same as for a linear system if the velocity in the radial direction can be regarded as constant over the width. Thus if Q is total flow rate through any concentric ring of radius r cm. and thickness one cm., $v = Q/2\pi r$.

If Q is constant, width of the capillarity zone is inversely proportional to r, except when width is of comparable magnitude to r (Fig. 1). For instance, when a front converges on a producing well one would expect the capillarity zone to become negligibly small because of high radial velocity.

In a five-spot system, then, a "capillarity zone" would only be expected to affect recovery in so far as it may affect saturation distributions in the so-called "dead areas." Fig. 2 shows the capillarity and trailing zones at two different times with the capillarity zone much exaggerated compared to most actual operations.

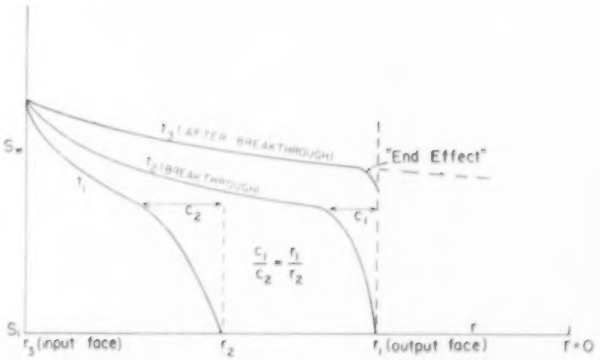

Fig. 1—Extent of capillarity (frontal) zone and trailing zone at three different times during inward radial displacement of oil by water in oil-wet core.

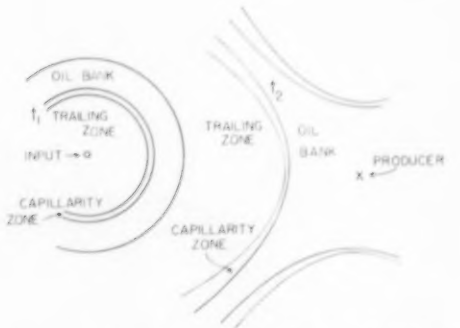

Fig. 2—Theoretical distribution of zones in a quadrant of a five-spot at two different times after initiation of secondary recovery.

ELECTRIC LOGGING—36

Best Uses of the Limestone Device

by R. I. Martin

THE limestone device has the advantage of giving clearer and simpler logs opposite thick and very resistive beds.

1. The log recorded opposite a thick, highly resistive bed shows a flat-topped curve, the height of which depends on mud resistivity, and the cross-sectional area of the hole, but is independent of the thickness of the bed, and of the position of the device in the bed.

2. Opposite conductive layers, sharp symmetrical depressions are obtained, the recorded widths of which are larger than the thickness of the streak by about the total length NN′ of the device.

It is desirable therefore to keep NN′ small, so that the depressions will be narrow. This is important when several thin beds occur close together. On the other hand, NN′ limits the spacing of the device, and if this is too small the apparent resistivities recorded will be low. As a result of field trials, the standard spacing used is AM = AM′ = 30 in., and MN = M′N′ = 4 in. This gives a spacing AO of 32 in., which is shown on the headings of logs which are taken with this device.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

The different apparent resistivities may be contrasted by referring to Fig. 1. Maximum apparent resistivities recorded are:

	Ohm-m
Three-electrode normal	550
Two-electrode normal	830
Lateral device	3,800

A standard limestone device, in contrast, will give 160 ohm-m, all other conditions remaining the same.

Since the apparent resistivities are so low, it is convenient to convert them to true resistivities. The readings obtained are the averages of those obtained with two similar three-electrode devices. Since AO is considerably greater than MN, the device may be compared with a lateral device with AO = 32 in., and MN infinitely small. Accordingly, a departure chart for lateral devices may be used. The true resistivities corresponding to the apparent resistivities on the heading of the log may be shown, and used.

These values will hold true as long as the hole diameter does not change. It has been explained earlier that the device is sensitive to changes in hole diameter. Fig. 2 illustrates this. A large increase in apparent resistivity takes place when the device is inside the 6⅛-in. diameter rathole below the 9-in. hole.

A caliper log was available, so that the true resistivities in the upper part of the hole include a correction for the changes in hole size which were measured. This is the reason why the lines of equal true resistivity are curvilinear. In the upper part of the hole, the true resistivity of infinity might correspond to an apparent resistivity of 100 ohm-m. The corresponding value in the lower part of the hole might be 200 ohm-m.

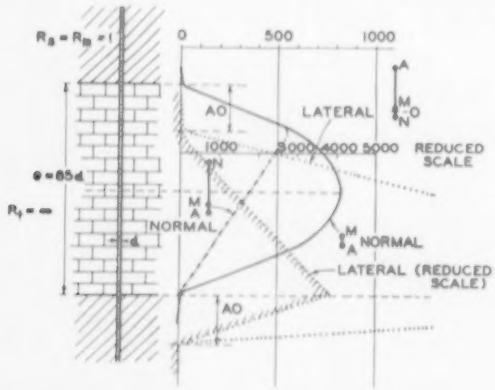

Fig. 1—A thick limestone bed with basic logging curves. Figures from Schlumberger Well Survey Corp.

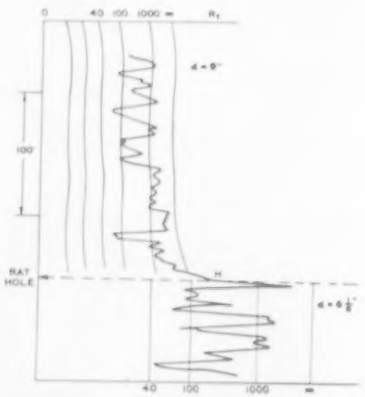

Fig. 2—Influence of hole diameters. A large increase in apparent resistivity occurs when hole size diminishes.

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Sampling for Continuous Analysis—3

by C. G. Fellows

Operation of the sampling system for an oxygen analyzer was discussed in the preceding installment where the gas flow was traced up to and including the liquid scrubber. A drawing of this system was presented in Installment No. 1.

THE effluent gas from the scrubber is now ready to be measured for its O_2 content. However, as previously stated, as the unwanted component is removed, the per cent by volume concentration of the O_2 also varies so that its initial concentration in the gas sample cannot be measured. Therefore, automatic volumetric substitution of an inert gas for that scrubbed out must be made. It is accomplished in the following manner:

6. When the condition of no volumetric substitution of the scrubbed-out sample component obtains, the record of the pressure recorder—upper right-hand corner of Fig. 1 (Installment No. 1)—will be seen to vary with the unwanted component variation. This occurs because the resistance to flow offered by the remainder of the sample system including the O_2 analyzer is a fixed quantity. Since the volume through it is varying, the pressure in this part of the sample system must vary accordingly. This variation in pressure is the means by which compensation is effected as follows:

7. An inert gas such as N_2 or CO_2 is piped through an additional sampling system to the top of the scrubber. CO_2 was selected as the make-up gas because its O_2 content was much lower than that of the available N_2 supply, which meant a more accurate O_2 measurement.

Author is with Carbide and Carbon Chemicals Co., South Charleston, W. Va., in special instrumentation department. Paper presented at 1954 Texas A. & M. instrumentation symposium.

The CO_2 is admitted through a pressure-reducing regulator R_2—regulators R_1, R_2, R_3, and R_4 are spring-loaded—and passes on through a small filter for the removal of dirt, thence through two needle valves and into another pressure-reducing regulator R_3. The 15-lb. "take-off" between the two needle valves affords a supply of CO_2 which, when admitted through valve 9 when valves 1 and 2 are closed, becomes the "zeroing" gas for the analyzer. From R_3, the CO_2 passes through orifice O_4 which is sized to produce a pressure drop of 50 in. of water for the rate of flow equivalent to the maximum volume per cent of the unwanted component the sample gas is expected to contain.

If this volume per cent is 20 to 60 per cent, the corresponding CO_2 makeup rate would be 50 to 150 cc. per minute. The flow of CO_2 passes through reducing regulator R_4, a ¼-in. shutoff valve, and then into the gas phase of the scrubber. The differential-pressure recorder across O_4 records the flow of CO_2. Therefore, its record can be calibrated in terms of the per cent by volume concentration of the unwanted component.

The action of the regulator R_4 is such as to maintain a constant downstream pressure which is essentially that of the scrubber-gas phase. If an increase in concentration of the unwanted gas occurs, the pressure will drop in the gas phase and immediately R_4 will open up to admit more CO_2 to restore the pressure. R_4 closes for a decrease in the unwanted gas component. Thus, automatic volumetric substitution is effected, and the O_2 content of the effluent gas from the scrubber is the same as in the inlet-gas sample.

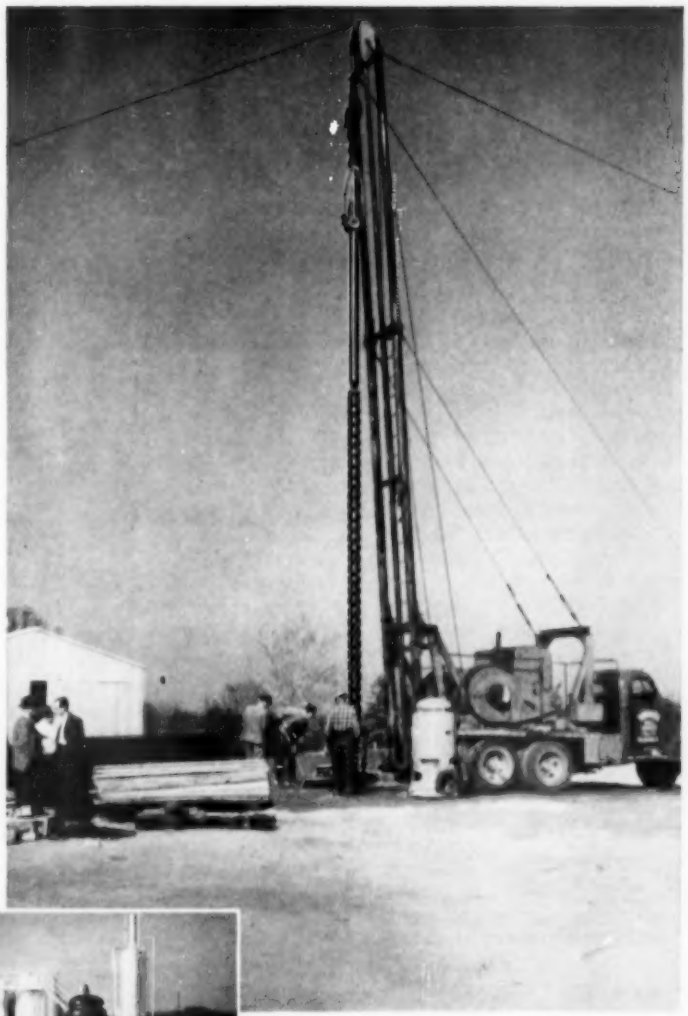
Enclosed by the dotted line in Fig. 1 (Installment No. 1) are those sample-system components which are mounted in a cork-lined metal housing for cleanliness, equipment protection, and to provide a small degree of temperature stabilization such as required if the case is subject to alternate exposure to sunlight and cloudiness or the heat of day versus the cool of evening. In these housings, the flow controller FC is frequently situated below the scrubber, and conditions can obtain whereby scrubber liquid could flow into the gas sample system via FC. To assure that such cannot occur, a 30-in. vertical loop in the gas sample line is inserted above the scrubber so that there is no way in which liquid can flow into the gas sample system since the 30-in. loop is longer than the 24-in. liquid seals.

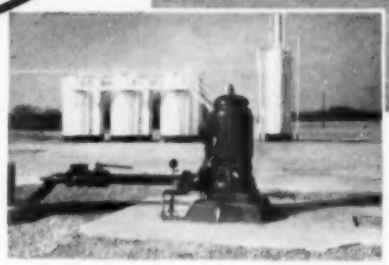
The effluent gas from S flows into a trap containing some glass wool near the top of it so that any water carried over from S will be agglomerated by the glass wool and will drain out through the 24-in. water seal attached to it. Brine can be used to cause condensation of the entrained water if necessary—sometimes the ambient temperature of the sample system is too high for efficient water removal. The effluent gas leaving this trap passes through a couple of orifices in series and on to the O_2 analyzer. Two large orifices in series are used in preference to a single smaller one because of the reduced possibility of plugging. The gas pressure leaving them is about 2 in. of H_2O.

In the lower left-hand section of Fig. 1 (Installment No. 1) is shown the schematic of the city water supply—50 cc. per minute rate—used for the scrubber. The spray nozzle was used as a simple adjustable orifice which could be routinely opened for cleaning purposes. This was found to be necessary despite the use of good filtering ahead of the reducing regulator.

PUMPS SOURCE WATER FOR SECONDARY RECOVERY FROM 1000 FOOT SETTING

PEERLESS PUMPS





A 1000 foot, 32-stage Peerless vertical pump being installed for source salt water pumping.

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LOCATION: Fayette County, Illinois. OPERATOR: Major oil producing company. NO. OF WELLS: 5. SETTING OF PUMPS IN WELLS: 1000 feet. HP OF MOTORS: 150 hp at 1800 rpm. CAPACITY: 10,000 bbls/day. TYPE OF PUMPS: 3 Peerless Water Lubricated Pumps, 2 Peerless Oil Lubricated Pumps; each are of vertical rotative shaft turbine type. PUMP CYCLING: Intermittent and continuous. PUMP MATERIAL: All iron.

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PEERLESS PUMPS fmc

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

How to Oxidize Asphalt

"We foresee that in the future we may have to oxidize some of our asphalt. Could you describe the latest methods, and where we can find literature on this subject?" R.M.

Although continuous oxidizers have been used,[1,2] the batch-type system is usually preferred because of its flexibility in producing numerous grades of material in a single system. However, heat and the investment in a pipe still, can be saved by delivering hot flux directly from the fractionating tower to a continuous oxidizer. Horizontal batch stills may be used but the bottoms of these tend to be "burned" and a longer blowing time is required than in vertical batch blowing towers because of the relatively low liquid level of the horizontal stills. Even tanks have been used[3] but these must operate at a low blowing temperature (300°-400°F.) and the softening points of the asphalts produced at these low temperatures tend to decrease[3] upon prolonged heating at 550°-600°F. Thus, the general type of vertical blowing tower system indicated in Fig. 1 is probably most widely used.

Range of Charging Stocks

Charging stocks range from heavy topped crude oils to low-penetration vacuum or steam-reduced asphalt, depending upon the penetration softening-point relationship desired in the final product. The feed is heated to 450°-550°F. but never to a temperature higher than 50° or more below its flash point and introduced into the blowing tower where it is met with 30-50 cu. ft. per minute of air for each ton of asphalt. Blowing towers have a "spider" inlet for air at the bottom, they are often jacketed with steam, and they have a steam connection at the top to blanket the asphalt should vigorously burning tend to take place. Capacities are somewhat as follows:

500-bbl. tower	12-ft. dia. by 45-ft. height
375-bbl. tower	10-ft. dia. by 40-ft. height

Explosion batches are mentioned by one writer.[4]

Air is passed through while the asphalt is at 400°-575° F. for a length of time (1½-5 hours) adequate to cause the desired changes in properties, and recirculation through the pipestill used to heat the fresh feed is often practiced. The level in the tower is held at two-thirds to three-fourths full. Catalytic agents such as ferric chloride or phosphorus pentoxide are sometimes introduced in small amounts (0.1-3.0 per cent) during the blowing.[2,5] By means of such agents, asphalts that have an abnormally high penetration (with respect to their softening points) may be prepared. When blowing is complete and the properties have been verified, water is introduced to top of the asphalt to cool it to about 450°F. (a lower temperature may lead to foaming).[2]

It is obvious that all oil or asphalt lines to and from the unit must be steam jacketed, or at least must have a "tracer", as well as the pumps (at least the suction inlet and the stuffing boxes). Any asphalt in the lines after use is blown out with air. Pumping temperatures should be high enough to maintain a viscosity below 5,000 S.s.U. and greater pump efficiency is possible if the viscosity is limited to 500 S.s.U.

The fumes are usually scrubbed with water to remove obnoxious gases or odors and to recover small amounts of oil. They can, however, be burned in a special stack.

References are not very specific about plant practice but references 2, 3, and 1 are the best of those listed herein. Thirty-three older references to the whole art of asphalt manufacture are listed in Reference 6.

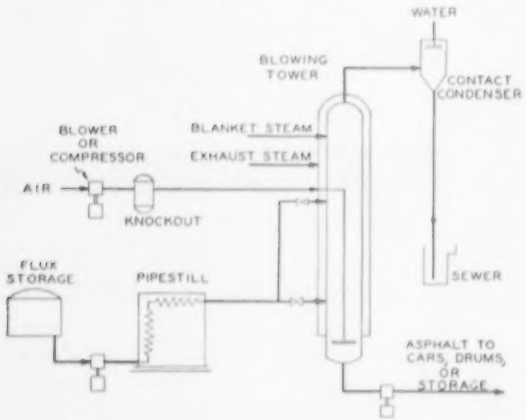

Fig. 1—Vertical-tower batch asphalt-oxidizing system.

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1. Uhl, Wm. C., Five Unique Design Features . . . Ohio Oils . . . Refinery, Pet. Processing, January 1950, p. 33.

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3. Hewett, C. M., Asphalt—the Black Sheep . . . , Pet. Engineer, April 1948, p. 140.

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Cetane-Number Requirement of Engines

"What cetane-number fuel is required of various types of diesel engines?" B.T.

Very small differences in engine or combustion-chamber design, changes the ignition-quality requirements of an engine. Accordingly, about all that can be suggested is that speed is a basic consideration:

Maximum operating speed, r.p.m.	Minimum allowable cetane number
up to 800	25
800-1,500	35
1,500-2,000	40
2,000 up	45

HERE'S HOW ONE REFINER SAVED WITH A LJUNGSTROM

COMPARATIVE FUEL AND POWER COSTS

	WITH AIR HEATER	WITHOUT AIR HEATER
Heat absorption /hr millions of BTU	100	100
Oil—inlet temp.—°F	700	700
Flue gas temp. to stack—°F	400	950
CO_2 to stack—%	10.0	11.0
O_2 to stack—%	5.2	3.7
EFF (assuming 5% radiation loss)—%	78.5	66.0
Millions of BTU required /hr	127.39	151.52
Annual cost of fuel ($2.50/Bbl—8000 hrs)	$392,000	$466,200
Kilowatt-hours	80	
Annual cost of energy @ 1¢/kwh—8000 hrs	$6,400	
Annual operating cost—fuel and energy—8000 hrs	$398,400	$466,200
Annual fuel savings	$74,200	
Annual net savings in operating costs *(fuel savings less energy costs)*	$67,800	

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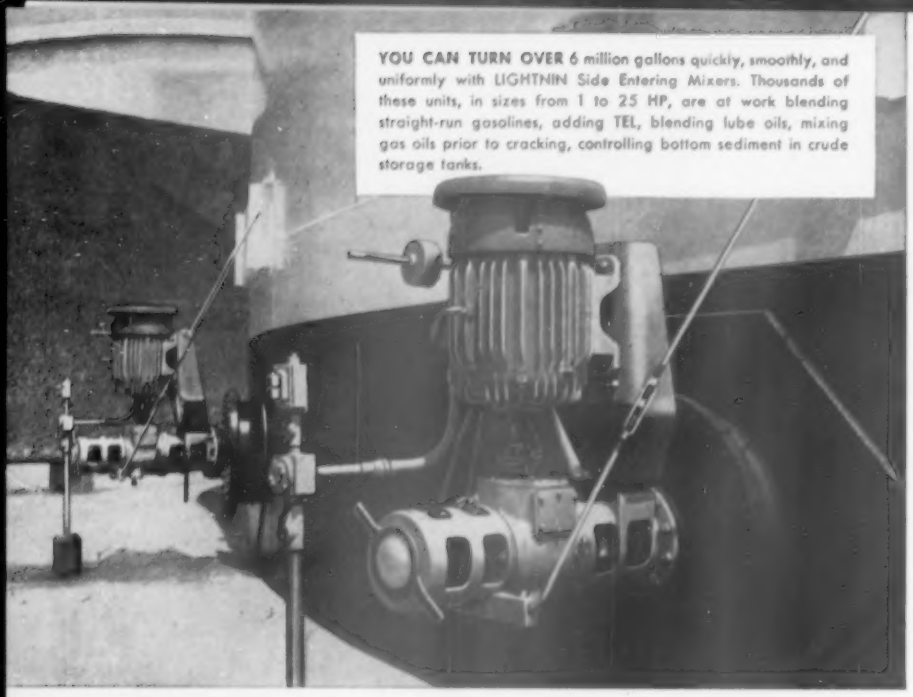

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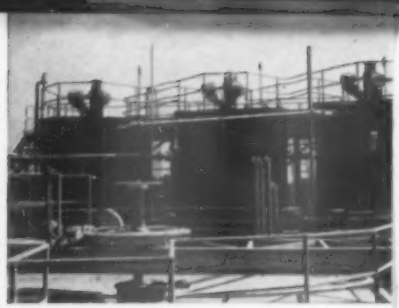

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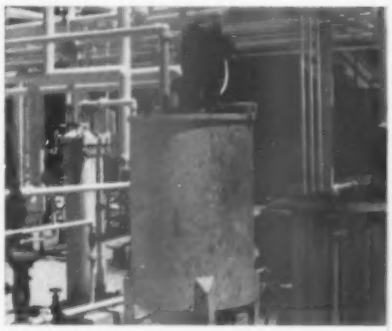

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by O. C. Blade

Survey Report: Motor Gasoline Octane Rises

FURTHER trends to new high-octane numbers were shown in the tabulation of national averages for the winter of 1953-54. For premium gasoline, the figures were 91.9 (research method) and 83.6 (motor method). For regular gasoline, the research octane number was 84.7 and motor octane number was 80.0. Comparisons with previous surveys are given in the U. S. Bureau of Mines report R.I. 5066 *(The Oil and Gas Journal, July 19, 1954, page 130).*

Table 1 gives a summary of values for this latest winter survey. Table 2 gives average octane-number values according to the 17 districts set up by the C.F.R. committee.

More detailed tables, district by district, are included in the R.I. 5066 for the gasoline properties other than octane numbers, such as gravity, corrosion, sulfur, gum, tetraethyl lead, Reid vapor pressure, and distillation characteristics.

Tests were made on 4,680 samples, representing 130 companies, according to standardized A.S.T.M. procedures. Corrosion-test results were compiled by number, reported according to the corrosion scale given in D130-50T in the 1953 A.S.T.M. manual.

Gum-test data were considered in two classes—true gums and gums oily in character for which the results are abnormally high, presumably because of additives. Only data that appear to represent true gum are given in figures; others are reported as "oily."

Charts are included in R.I. 5066 to illustrate trends in the national averages of certain properties of regular and premium-price gasolines. A map of the C.F.R. districts is also included, with locations and number of samples in this latest Bureau of Mines survey indicated.

Author is petroleum chemist, U. S. Bureau of Mines petroleum experiment station, Bartlesville, Okla.

A copy of R.I. 5066, "National Motor-Gasoline Survey, Winter 1953-54," by O. C. Blade, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number (P.N. 63773) and title.

TABLE 1—MOTOR-GASOLINE SURVEY, WINTER 1953-1954

	Regular-price gasoline			Premium-price gasoline		
Test—	Min.	Avg.	Max.	Min.	Avg.	Max.
Gravity, °A.P.I.	55.4	62.7	71.4	55.9	62.5	71.7
Sulfur content, wt. per cent	0.014	0.088	0.432	0.019	0.077	0.382
Gum, mg. per 100 ml.	0.0	1.7	5.0	0.4	2.0	5.2
Tetraethyl lead, ml. per gal.	0.02	1.99	3.06	0.00	2.29	3.26
Octane number research	78.3	84.7	91.4	85.7	91.9	96.6
Octane number, motor	75.5	80.0	85.8	78.8	83.6	89.0
Reid vapor pressure, lb.	6.5	10.6	13.5	7.5	10.6	13.7
Distillation test, on evaporated basis:						
Initial boiling point, °F.	81	91	117	78	91	104
5 per cent	85	105	131	92	105	121
10 per cent	99	120	153	98	119	136
30 per cent	130	174	223	132	164	189
50 per cent	164	223	279	163	211	247
90 per cent	233	336	376	274	333	374
95 per cent	310	365	394	307	362	405
End point	348	405	446	346	402	436
Residue, vol. per cent	0.4	1.0	1.5	0.4	1.0	1.5
Distillation loss	0.3	2.3	5.0	0.5	2.0	6.0

TABLE 2—OCTANE-NUMBER AVERAGES BY C.F.R. DISTRICTS

	Research method		Motor method	
District—	Premium-price	Regular-price	Premium-price	Regular-price
1. **Northeast area:** Maine, Massachusetts, New Hampshire, Vermont and northern New York	93.7	87.8	84.2	81.9
2. **Mid-Atlantic Coast Region:** Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, Central and southern New York, and eastern Pennsylvania	93.5	87.6	84.0	81.7
3. **Southeast area:** North Carolina, South Carolina, Georgia, Florida, Alabama, and eastern Tennessee	93.0	86.4	84.0	81.4
4. **Appalachian area:** Ohio, West Virginia, western New York, western Pennsylvania, eastern Kentucky, and a small portion of Maryland	93.0	87.7	84.1	81.9
5. **Michigan**	92.8	86.7	84.1	81.1
6. **North Illinois area:** Northern Indiana, northern Illinois, eastern Iowa, and Wisconsin	91.0	84.0	83.7	80.3
7. **Central Mississippi area:** Western Kentucky, southern Indiana, southern Illinois, and eastern Missouri	91.3	85.1	83.6	80.5
8. **Lower Mississippi area:** Mississippi, Louisiana, eastern and southern Arkansas, and western Tennessee	93.0	85.7	83.9	81.0
9. **North Plains area:** Minnesota, North Dakota, and South Dakota	90.2	83.7	83.3	79.5
10. **Central Plains area:** Nebraska, Central and western Iowa, northwestern Missouri, and northern Kansas	90.0	83.6	83.0	79.6
11. **South Plains area:** Southern Kansas, southwestern Missouri, western Arkansas, Oklahoma, and northern Texas	91.6	83.8	84.2	79.8
12. **Southern Texas**	93.4	85.9	85.2	82.3
13. **South Mountain States:** Southwestern Kansas, Panhandles of Oklahoma and Texas, western Texas, New Mexico, Colorado, Utah, Arizona, Nevada, and eastern California	90.3	81.6	83.3	78.2
14. **North Mountain States:** Wyoming, Montana, Idaho, eastern Washington, and eastern Oregon	90.4	82.7	81.8	77.7
15. **Pacific Northwest:** Western Washington, and western Oregon	91.9	82.6	82.9	77.6
16. **Northern California**	91.9	82.7	82.9	77.8
17. **Southern California**	91.6	82.3	82.5	77.7

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The solid head packer you've been wanting a long time and at a price you'll be glad to pay. The AF is short, compact, strong and reliable in operation. Positive seal of pressure below the packer at any depth. Design features include friction pads, automatic latch and dove-tail slips and head. Special rubber has built-in ability to return to original shape. It will not vulcanize to casing wall and is acid, oil and gas resistant. Best of all, here is a packer you can handle—in the well or out! Over-all length of 5½″ or 7″ size is less than four feet!

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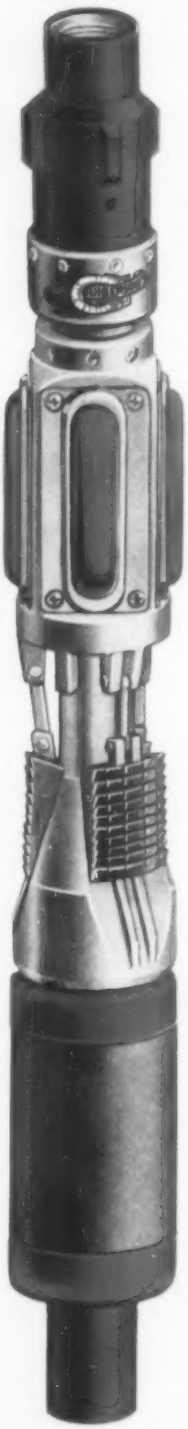

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by Henry B. Woods

New Methods of Hard-Rock and Jet-Bit Drilling

IN hard, brittle rocks, drilling rates increase rapidly for slight increases in bit weight. For example, a 30 to 40 per cent increase in weight might double drilling rate. (See Fig. 1.) Because of this, operators who years ago experimented with heavier weights applied through long strings of drill collars, found that the laboratory results were confirmed and drilling costs were lowered.

The actual mechanics of hard-rock drilling seems to be quite simple. Enough load is applied to a bit to crush or chip the rock at the four or five points where cutter teeth are bearing on the rock. The cutters rotate so that the points of application of load are continually being displaced to other cutter teeth bearing on other places on the rock. The flushing fluid removes chips that have broken loose and, if high-velocity jets are used, removes small pieces of rock that have been partially loosened.

One problem has been that with the loads required to produce effective chipping of the formation in very strong rocks, the cutter teeth are stressed almost to their failure point. In addition, if the rocks are also abrasive, cutter teeth wear rapidly.

The tungsten carbide studded bit was developed for drilling the extremely hard and abrasive cherts and quartzites. Tungsten carbide has a compressive strength of 800,000 psi. compared to 400,000 psi. for hard steel. Early work showed, however, that because of its brittleness, a tungsten carbide tooth of the same size and shape of an ordinary rock-bit tooth was worthless.

Luckily, most of the hard, brittle rocks do not require a sharp tooth for efficient drilling. Cylinders of tungsten carbine with hemispherical ends are used, which structure will stand high impact without fracturing and will drill in the hard, brittle rocks with high efficiency.

The economies possible with these bits depend on depth. Actually, because of the great reduction in number of round trips, they are economical for the drilling of abrasive limes and dolomites if they are encountered below 10,000 ft. On the other hand many shales require a sharp bit for efficient drilling and the carbide-studded bit is next to useless in such formations.

The load on a rotary bit is high, and during rotation the load is continually being transferred from tooth to tooth. During the transfer of the load from one tooth to an adjacent tooth, little if any useful work is done. If there were some way of applying enough load to a tooth or number of teeth to chip the rock and then instantly remove the load, index the bit to another position and apply the load again, considerably less average weight would be needed.

Several groups, including Hughes Tool Co., are working on various approaches to a percussion tool that will permit rapid penetration rate without the extreme weights so necessary with regular rotary drilling. The number of blows per minute on these various tools varies from about 300 to 60,000.

Our tool strikes about 1,800 times per minute. In laboratory tests drilling rates of 30 ft. per hour have been obtained in hard quartzite as compared to 5 ft. per hour with the same weight and rotary speed in conventional drilling. Unfortunately, we have not been able to duplicate these results in field trials and we find that there are very serious design problems involved in obtaining a structure that will withstand severe abrasion and fatigue.

Jet bits . . . The use of jet bits is increasing. Knowledge of the fact that the proper use of a jet bit involves a study and sometimes revamping of the circulating system has resulted in fewer cases where jet-bit trials were not successful. Continued research has shown that there are very few formations which cannot be drilled more cheaply with jet bits operated under proper conditions.

For field research work on jet-bit performance, there is a so-called duplex sub which is run right above a rock bit. There are two sets of mud passages through the sub. One directs the mud stream to conventional nozzles and the other to jet-bit nozzles. A valving mechanism insures that during operation, one set of the passages is closed and the other open. Stopping and starting the mud pump causes the valve to index.

Thus in an actual well, a few feet may be drilled with conventional nozzles then a few feet with jet nozzles and the alternation continued. By averaging the drilling rates obtained under jet operation and conventional operation, a drilling-rate comparison may be obtained with possible changes in formation averaged out.

Except in cases where there were obvious extreme changes in formation, jet operation shows increases in drilling rate over conventional bit operation. The over-all average increase with jet bits in these tests is about 20 per cent. Of course such a test gives only a drilling-rate comparison and the over-all footage comparison must be made by the other methods.

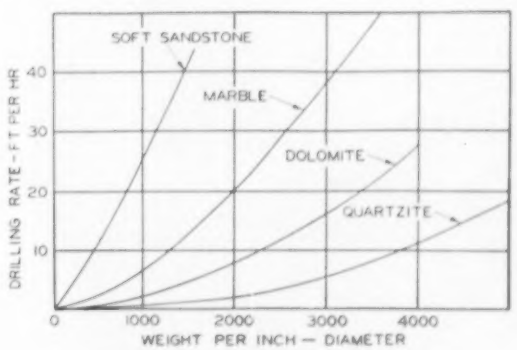


Fig. 1—Effect of weight on drilling rate.

*Author is with Hughes Tool Co., Houston.

ACCO products

CAST STEEL

PRESSURE CLASSES FROM 150 TO 2500 PSI

• R-P&C's cast steel valve line includes gate, globe, angle, swing check and lift check styles in a wide variety of sizes, pressure classes and body and trim materials. Typifying the quality construction of the entire cast steel line is the valve illustrated at left, the

fig. 1501—This popular OS&Y flanged end gate valve has a primary rating of 150 psi at 500° F. It is furnished in sizes from 1½" to 24". Construction features that lengthen valve life, lower maintenance requirements, include:

wedge and wedge guides—Solid I-beam type wedge for maximum resistance to distortion. Wedge guides, cast to true center of seating surfaces, guide wedge to a perfect seat—make contact only at point of closure.

seat rings—Bottom-seated type, of heavy uniform cross section. There are no points of high stress concentration. Broad seat contact and smooth finish give longer life, less wear. Port openings are full pipe diameter for lower pressure drop.

stainless steel trim—Regularly furnished with 12-14% chromium trim for greater corrosion resistance. Other trim materials, suitable for a wide variety of special services, furnished on request.

stem—Head forged integral engages wedge slot, provides self-alignment.

packing—Long fibers of 95% chrysotile asbestos are square braided and reinforced by wire insertions, lubricated with graphite and oil. This special packing produces tight joints at high temperatures and pressures, lowers stem friction, decreases maintenance requirements.

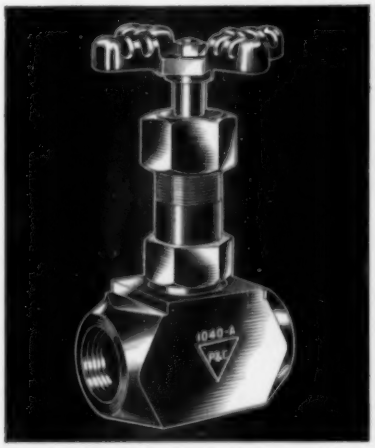
castings—All castings produced in R-P&C's own foundry under careful metallurgical controls. Conform fully to requirements of standardization societies and customers' specifications.

for further information on Fig. 1501 or other R-P&C cast steel valves, write for Catalog 9

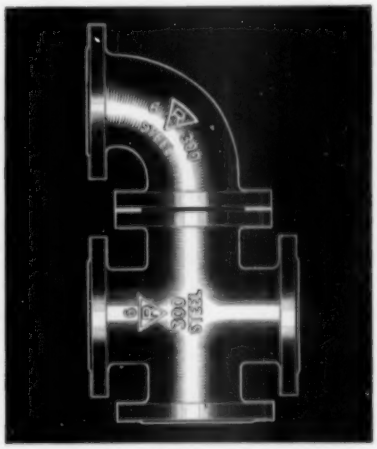
VALVES from 1½" to 24"!

FROM R-P&C's COMPLETE LINE

Pressure sealed bonnet joint cast steel valves are furnished in gate and globe valve styles in 900 lb., 1500 lb., and 2500 lb. pressure classes.



Bar stock valves are precision machined from highest quality bronze, carbon steel, or alloy steel bar stock. Working pressures for carbon steel range from 10,000 lbs. at 150°F to 475 lbs. at 1,000° F. Sizes from ⅛" to 1".



Cast steel fittings, ells, tees, laterals, crosses, reducers — screwed or flanged ends. Furnished in a wide variety of sizes up to 24", in pressure classes from 150 lbs. to 2500 lbs.

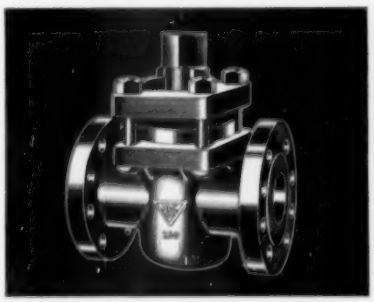
THE SECRET OF R-P&C's BETTER VALUES— QUALITY CONTROL

• A vital component of each R-P&C Valve is an ingredient you can't see. This hidden ingredient insures that you get the trouble-free operation and longer life engineered into each R-P&C design.

This hidden ingredient is called "quality control." It is a philosophy that dominates every step of the manufacturing operations that produce each R-P&C Valve.

Castings for every R-P&C Valve are produced in our own foundries under careful metallurgical controls. Casting soundness is verified by special radiographic techniques using radium or radioactive isotopes. Dimensional accuracy of each valve part is checked by a variety of gauging methods, including some specially developed by R-P&C engineers.

Before it leaves the factory, the performance of each valve is proved by individual hydrostatic and other tests. These tests are normally conducted at pressures higher than those for which the valves are rated.



Asbestos-packed cocks, an R-P&C exclusive, are furnished in iron in sizes from ¼" to 6" with screwed or flanged ends.

Fig. 212 screwed end bronze check valve typifies R-P&C's complete check valve line — furnished in iron, bronze or cast steel in sizes ranging from ¼" to 24".

WHICH OF THESE HELPFUL TECHNICAL AIDS DO YOU WANT?

R-P&C provides a wide variety of free technical aids to assist the buyer in valve selection, installation and operation. Among these are:

Valve Selector Slide Rule. Handy selector slide rule gives all dimensions for iron body valves, steel valves in 150, 300, 400, 600, 900 and 1500 lb. classes.

How To Select Valves. 17" by 11" wall chart lists principles to use in selecting valves for various applications . . . considers effects of fluids, temperatures, pressures, sizes, service requirements.

How To Protect Your Valves. 17" by 11" wall chart lists 22 installation and operation pointers to protect valves, get maximum life.

How To Know Valves. 17" x 11" wall chart graphically illustrates appearance, construction, operation, recommended applications for gate, globe and check valves, cocks.

Any of these free technical aids furnished promptly on request
Write R-P&C Valve Division, American Chain & Cable, Reading, Pennsylvania

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TOP and LOWER SIDE CONNECTIONS

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Factory calibrating or zeroing adjustment produces a correct 3 to 15 pound signal output for full float range operation, as particularly required in liquid level indication. Output signal of controller is linear as related to level height change.

Simple level adjustment indicating dial.

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REFINING

Robot Unit Ready

First electronically-run Platformer goes on stream

INDIANAPOLIS.—Rock Island Refining Corp. has gone on stream with the first refining unit entirely controlled by electronic instruments at its refinery near here.

The unit is a 2,400-bbl. Platformer which takes the heavy fraction off a fractionation tower to produce a 95 octane number product later used in blending purposes.

All measurement and control impulses are handled electronically and tubing racks have been eliminated throughout the unit. Refinery officials said that electronic equipment will eliminate maintenance problems found in conventional instrumentation and will make for better reliability during cold weather.

The Platformer was designed, engineered and licensed by Universal Oil Products Co., and constructed by refinery personnel in approximately a year.

Sunray Completes Reformer

DUNCAN, Okla.—Sunray Oil Corp. has gone on stream at its refinery here with a 5,000-bbl. per day Platformer.

The completion of the new unit coincides with initial operation of Oklahoma Mississippi River Products Line, Inc., in which Sunray has a 50 per cent interest. The line, which runs from Duncan to West Memphis, Ark., on the Mississippi River, will be used to transport the major portion of Sunray's products.

Refinery Engineering Co., Tulsa, began construction of the unit in January of this year. Sunray's refinery staff handled construction work on the feed preparation unit and most of the other offsite facilities.

Girbotol Plant Contracted

PORT ARTHUR, Tex. — Gulf Oil Corp. has announced that Girdler Co., Louisville, Ky., soon will start construction of a Girbotol gas-purification plant here.

The new unit, the fourth to be designed and built by Girdler at Port Arthur, will use a diethanolamine solution to remove carbon dioxide and hydrogen sulfide from a gas stream used as a charge stock for Gulf's ethylene plant. The hydrogen sulfide recovered will be sent to a sulfur-recovery unit.

Royalite Buys Remainder Of Prince Albert Stock

CALGARY.—Royalite Oil Co., Ltd., of Canada has purchased the 50 per cent capital stock interest held by Canso Oil Producers, Ltd., in Prince Albert Refineries, Ltd.

The purchase gives Royalite 100 per cent ownership of the Prince Albert, Sask., refinery which will continue to operate under its present name.

Prince Albert Refineries presently manufactures and markets burner fuels, tractor distillate, gasoline, and asphalt. The company processes crude from the Coleville, Sask., field.

Refining Briefs

BALTIMORE.—Crown Central Petroleum Corp. has commenced construction of a 5,500-bbl. per day Houdriformer at the Houston refinery. The unit, licensed by Houdry Process Corp., is being built by Blaw-Knox Co. with completion scheduled for October.

WILMINGTON, Del. — The Du Pont Company has taken options on land in California and plans to build a plant to manufacture tetraethyl lead and "Freon" refrigerants. Location of the proposed plant and possible commencement of construction were not revealed.

OIL CITY.—A 9,000-bbl. atmospheric distillation unit, the largest in this area, is expected to be placed on stream later this month at the Pennzoil Co.'s Rouseville refinery near here. The unit will replace three distillation units with a combined capacity of 10,500 bbl.

PORTLAND, Ore.—Tide Water Associated Oil Co. will increase its terminal storage facilities and tanker unloading capacities here. The company will build a 17,000-bbl. oil storage tank and will also add four larger pipelines to bring products from the dockhead to the storage plant.

WASHINGTON.—The demand for synthetic lubricants for jet engines is expected to total 1,705,000 gal. during

NATIONAL AIROIL FUEL OIL - GAS BURNERS SERVING INDUSTRY FOR 42 YEARS

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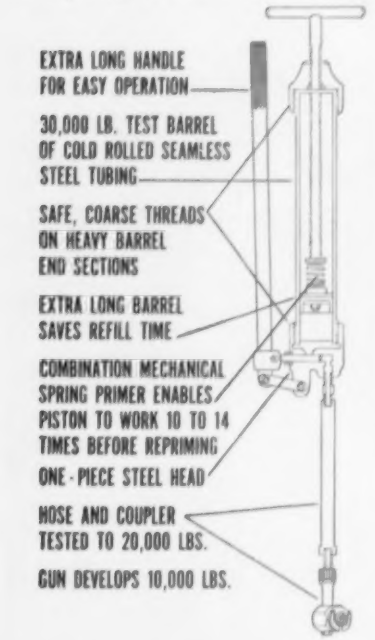
These Features make the **DELTA** High Pressure **GUN** the OPERATORS' FAVORITE for plug valve lubrication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the next 3 years, then increase considerably after 1957, according to Thomas P. Pike, assistant secretary of defense. Pike said the demand is expected to hit 250,000 gal. in 1955, 601,000 gal. in 1956, and 854,000 gal. in 1957.

Petrochemicals

Shell To Pipe Hydrogen For Chemical Synthesis

SAN FRANCISCO. — Excess hydrogen from Shell Oil Co.'s. recently completed Platformer will be transported from its Martinez refinery to Shell Chemical Co.'s ammonia plant at Pittsburg as soon as a 15-mile pipe line is completed. There it will be used for synthesizing into anhydrous ammonia after being scrubbed clean of impurities. The new $1,700,000 reformer currently is processing some 5,700 bbl. of feed daily.

Conoco Goes on Stream With New BTX Process

LAKE CHARLES, La.—Continental Oil Co. has completed a $16,000,000 expansion at its refinery here and has become the first refining company to extract benzene, toluene, and xylene simultaneously from petroleum by the sulfur dioxide process.

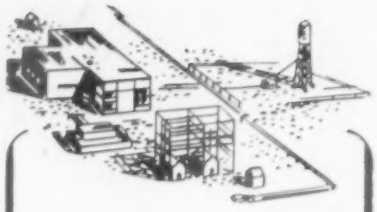
Stone & Webster Engineering Corp. built the SO_2 extraction unit as part of the expansion program which added 30,000-bbl. per day to the crude processing capacity of the refinery in addition to catalytic cracking, catalytic cracker feed preparation, catalytic polymerization, product fractionation and gas recovery, catalytic reformer feed preparation, and alkylation.

The expansion makes the Lake Charles refinery of Conoco rank as one of the major diversified plants in the United States.

Construction For NH_3 Plant Set By Salt Lake Chemical

SALT LAKE CITY.—Salt Lake Chemical Co. will begin construction here immediately on an $8,000,000 anhydrous ammonia plant. *(The Oil and Gas Journal, March 1, page 47.)*

The company expects to be in operation by December 1955, with a capacity of 120 tons of anhydrous ammonia and 30 tons of dry ice daily. Salt Lake does not intend to compete with fertilizer manufacturers in the region, but will supply them with basic raw materials.



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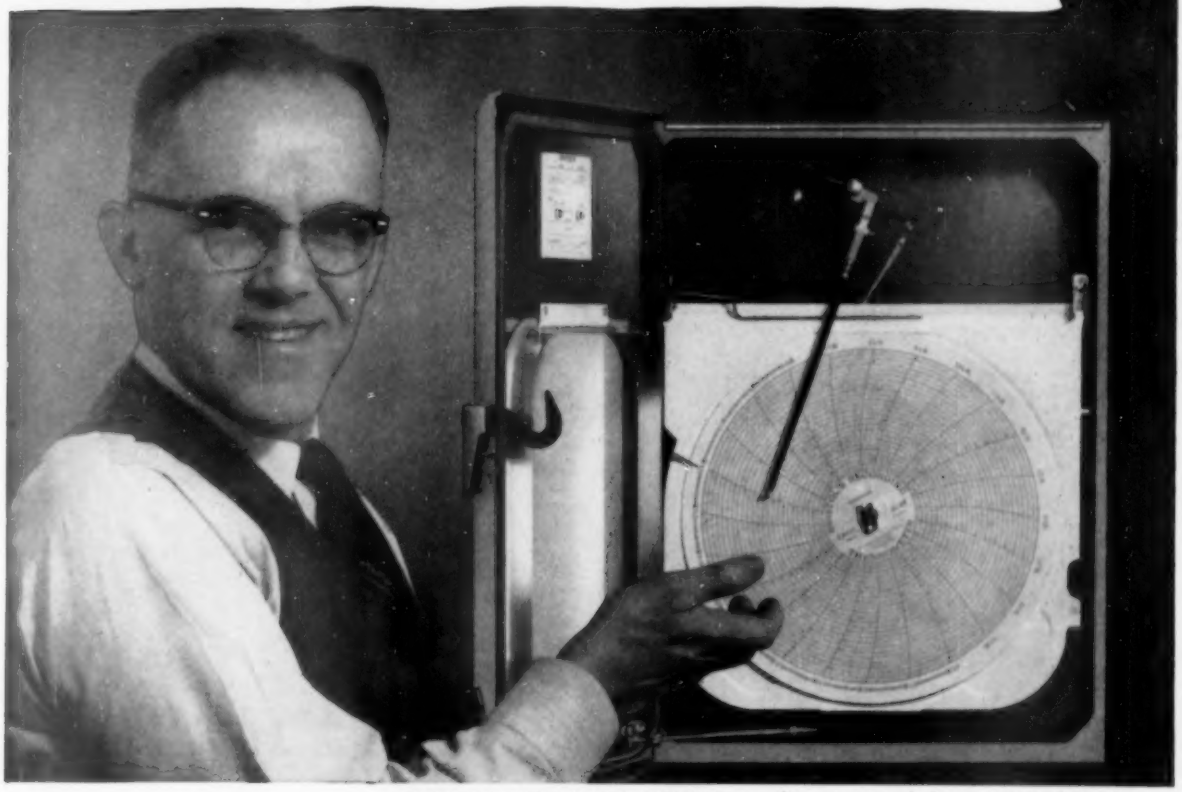
WHAT'S NEW AT BRISTOL . . . . WHAT'S NEW AT BRISTOL

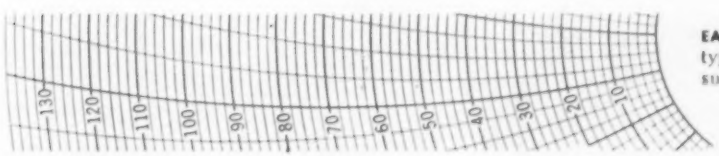


HIGH-SPEED RESPONSE AND ACCURACY are characteristic of the new Bristol Dual-Filled Vapor Pressure Thermometers. Unlike conventional vapor pressure thermometers, the Bristol units can be read with equal ease and accuracy throughout the entire measured range.

Another Bristol first — Dual-filled Vapor Pressure Thermometer with uniform linear scale

• These new instruments are the latest example of Bristol's continuing leadership in the field of industrial thermometry. They represent the first really important advance in filled-system thermometer design in more than 25 years. With this new development, all the valuable features of the vapor pressure system are retained. In addition to the linear scale, the elimination of ambient temperature effects makes new standards of accuracy possible.

Get the complete story on these rugged, precision instruments. Write for free 48-page bulletin T840. It will tell you all about typical installations, ranges, charts, bulbs and tubing. The Bristol Company, 120 Bristol Road, Waterbury 20, Conn.



EASY-TO-READ. This full-size section of a typical Bristol Dual-filled Vapor Pressure Thermometer chart shows the extreme clarity and definition of its uniform linear scale.

4.12

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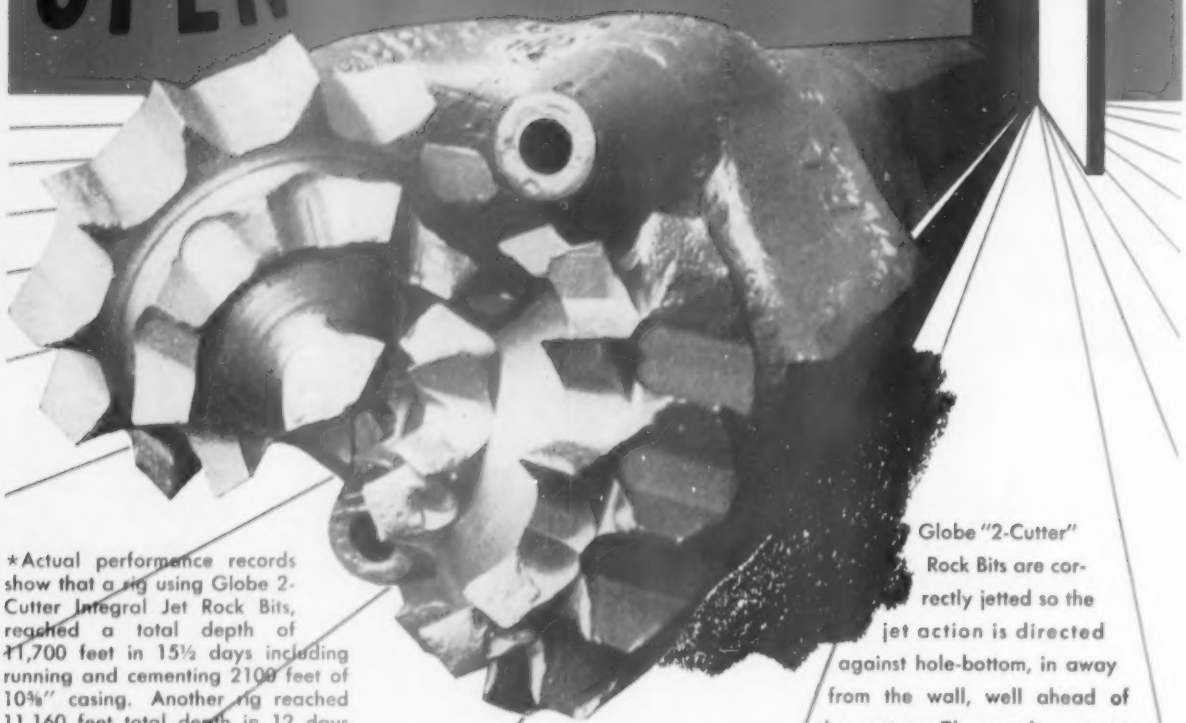

*Actual performance records show that a rig using Globe 2-Cutter Integral Jet Rock Bits, reached a total depth of 11,700 feet in 15½ days including running and cementing 2100 feet of 10⅝" casing. Another rig reached 11,160 feet total depth in 12 days and 5 hours using only 11 bits.

Globe "2-Cutter" Rock Bits are correctly jetted so the jet action is directed against hole-bottom, in away from the wall, well ahead of the cutters. The result . . . cutter teeth on Globe "2-Cutter" Jets **always dig** in new formation . . . making full penetration at every turn! . . . often reducing drilling time as much as 50% in some formations!

Insist on a Globe "2-Cutter" Jet . . . **setting a new standard for oil well drilling.**

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Among the Drilling Contractors

Canadian Drilling Firm Makes Change in Name

Shareholders of McIvor Drilling Co., Ltd., voted that the company name be changed to Hi-Tower Drilling Co., Ltd., at the annual meeting held in Calgary.

The company has been one of the most active among the drilling contractors in Manitoba. Officers and directors elected to the company at the meeting were: Ralph F. Will, chairman; J. W. Wark, president and managing director; J. Q. Gammon, vice president; H. G. Bryden, secretary - treasurer; E. N. Williams and C. S. Robinson, directors, all of Calgary and E. J. Williams of Winnipeg, director.

Ocean Drilling & Exploration Co., Houston, has contracted with Shell Oil Co. for two additional offshore tests in the Mississippi Delta area, off the south tip of Plaquemines Parish, Louisiana. One is a development well in South Pass Block 24 field. The other is a wildcat several miles southeast of the Block 24 area with location on State Lease 1012, in Block 28. Both contracts are for 11,000 ft.

Southern Production Co., Dallas, is moving a rig to Norco field, 30 miles up the Mississippi River from New Orleans, in St. Charles Parish, coastal Louisiana, where it is under contract for another well to be drilled for California Co. The new operation, 4 U.S.A., the first new drilling there in nearly a year, will be the latter company's fifth test in the area. Previous development in the area, discovered in November 1952, consists of three producers and one dry hole.

"The driller quit this morning."
Copyright, The Oil and Gas Journal

Rowan Drilling Co. has been let contract to drill Tide Water Associated Oil Co. E-2 Manhattan Land & Fruit Co. in Plaquemines Parish's Venice field, South Louisiana. The 17,000-ft. wildcat is located 660 ft. east and 330 ft. south of the northwest corner of 22-21s-30e. Field production has been found as deep as just above 15,000 ft.

Cron & Gracey Drilling Co. is contractor for Shell Oil Co. 12 State Lease 1009, new test in the South Pass Block 24, Plaquemines Parish, South Louisiana.

Pike Drilling Co. has been awarded contract to drill Standard 1 State C on a tideland permit offshore from West Montalvo, Calif. The wildcat will go to 13,800 ft. or deeper.

Hays & Sprague, contractor, is set to take a wildcat for Fullerton Oil Co. to 11,000 ft. for a test of the Vedder or on down for a look at the Eocene. The wildcat is the 1 Union Central Life Insurance Co. in 16-24s-23e, in the Trico gas area of Tulare County, California.

Miller & York will handle the drilling contract job for D. W. Elliott, Long Beach operator, for 58-12 S.F.&F.L. in 12-25-19, about 7 miles northwest of production in Lost Hills field, California. The test calls for a depth of 4,000-4,500 ft. Miller & York will also handle Palomar Oil & Refining Co.'s step-out test at the north end of Poso Creek field, California. Completion will be attempted from the Etchegoin if the Santa Margarita is not of commercial interest.

K&E Drilling Co. has contract for a new wildcat 4 miles west of Amber Mills pool and 11 miles northwest of Medicine Lodge, Kans. It is Orville Parker 1 Winter, NE NE SW 18-30s-12w.

Fleet Drilling Co. has contract for a new Garfield County, Oklahoma, wildcat in SW SW SW 20-22n-4w, about 4

STOP LEAKS

It is not easy to keep casing and tubing from leaking, especially in deep, high-pressure wells. The high percentage of metallic lead in 'Bestolife Lead Seal actually provides a plastic lead gasket for threads as joints are made up. That's why joints made up with 'Bestolife won't leak, strongly resist corrosion, and can easily be broken out—even years later. Your local supply store stocks 'Bestolife in 1¼, 5, 20 & 50 lb. cans. Unconditionally guaranteed.

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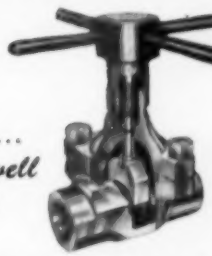

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hard-chrome gate resists scratches or nicks and the buna-N (Hycar) seat insert is molded integrally over steel wear rings for extra-long life, MUDWONDER . . .

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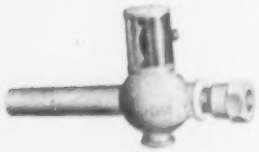

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• Casing, tubing, drilling rig, field, flow and separator line connections are leak-proof when made up with Rectorseal #1.

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Rectorseal #1 is economical — easy to use. Available in quart and gallon cans. Ask for it by name at your Supply Store.

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RECTORSEAL
Manufactured by
RECTOR WELL EQUIPMENT CO., INC.
Fort Worth, Texas
MAKING THE OIL INDUSTRY SAFER

miles northeast of Fairmont. It is Inland Oil Co. of Oklahoma City 1 Frickenschmidt, 1¾ miles west of Garber pool production in northern Oklahoma. The wildcat will go to 2,950 ft.

Lewis Drilling Co. is contractor for a new wildcat 1½ miles southeast of Southwest Dunes pool and 9½ miles southeast of Larned, Kans., in Pawnee County. It is Atlantic Refining Co. 1 Jay Smith, NW NW SW 3-23s-15w.

Brown Drilling Co. has contract for a 5,800-ft. wildcat in the Kirby Hills area of northern California's Solano County. It is Trico Oil & Gas Co. 2 Blacklock, in 19-4n-1e. The wildcat will look for gas production.

Penrod Drilling Co. is contractor for a wildcat 2 miles south of North Crowley field in Acadia Parish, coastal Louisiana. It is the Hassie Hunt Trust 1 Chappius & Lawson, 9-9s-1e. The wildcat has set 7-in. string to 10,542 ft. and is preparing to go ahead to the Nodosaria section or 12,000 ft.

W&W Drilling Co., Lewisville, Ark., has contract for W&S Oil Co. 1 Wheelis, SE NE 16-16s-24w, new Paluxy wildcat in West Lewisville field, Lafayette County, southwestern Arkansas. The well is about ½ mile east of nearest Paluxy production. It is only a few feet from a good Tokio producing well.

Wagner-Wyant Drilling Co. has contract for another Purdy sand test in the East Sturgis area off the southeast flank of Keyes field in western Texas County, Oklahoma Panhandle. The well will be Cabot Carbon Co. 2 State of Oklahoma "B", spotted in SE NW NW 30-5n-10eCM. It is contracted to 4,400 ft.

Whiteley Drilling Co. is contractor for British-American Oil Producing Co. 1 Holcomb, Z. Gibbs Survey, A-21, Cherokee County, East Texas wildcat 9½ miles southwest of Rusk, Texas. **F&H Drilling Co.** is moving in rig at Cities Service Oil Co. 1 Briggs, Henderson County, East Texas wildcat on the Phillips Jackson Survey, A-392. The wildcat is 2 miles west of LaRue.

Palmer Oil Development Co., Ltd., has contract for a new development well in the Frobisher area of southeastern Saskatchewan to be known as Canadian Gulf 5 Gridoil Alfred. The venture is in LSD 5, 35-3-4w2, ⅜ mile northeast of the 1 Quinn, Charles lime producer, and the same distance southwest of 13 Moffat, Charles and Mission Canyon oil well, and ⅜ mile southeast of 9 Quinn, discovery well.

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CENTRIFUGE

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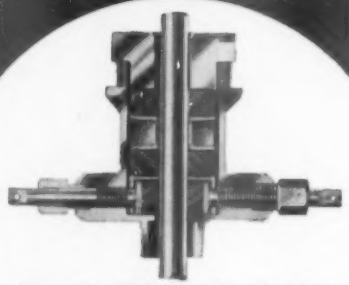

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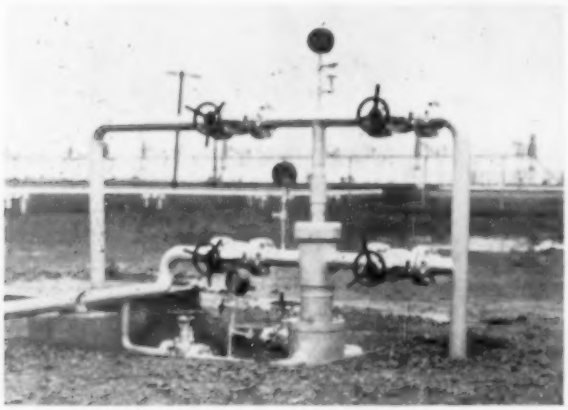
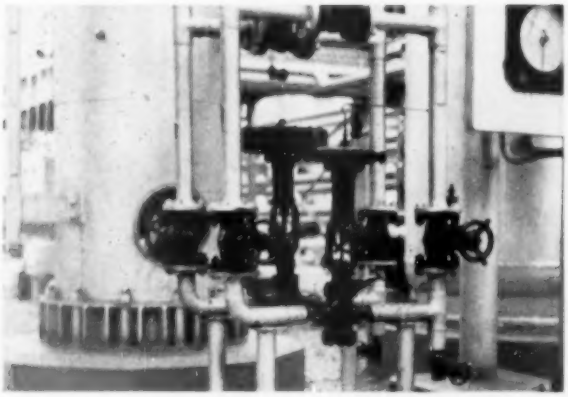


Surface installations over propane underground storage well in Kansas.

Suction and discharge propane and water lines at underground storage project in Kansas.



Blending tanks. Blending 18 lb. gasoline up to 38 lbs. vapor pressure.

Manifold dome — propane surface storage.

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Orbit Forged Steel LP-Gas Valves are *vapor tight* because:

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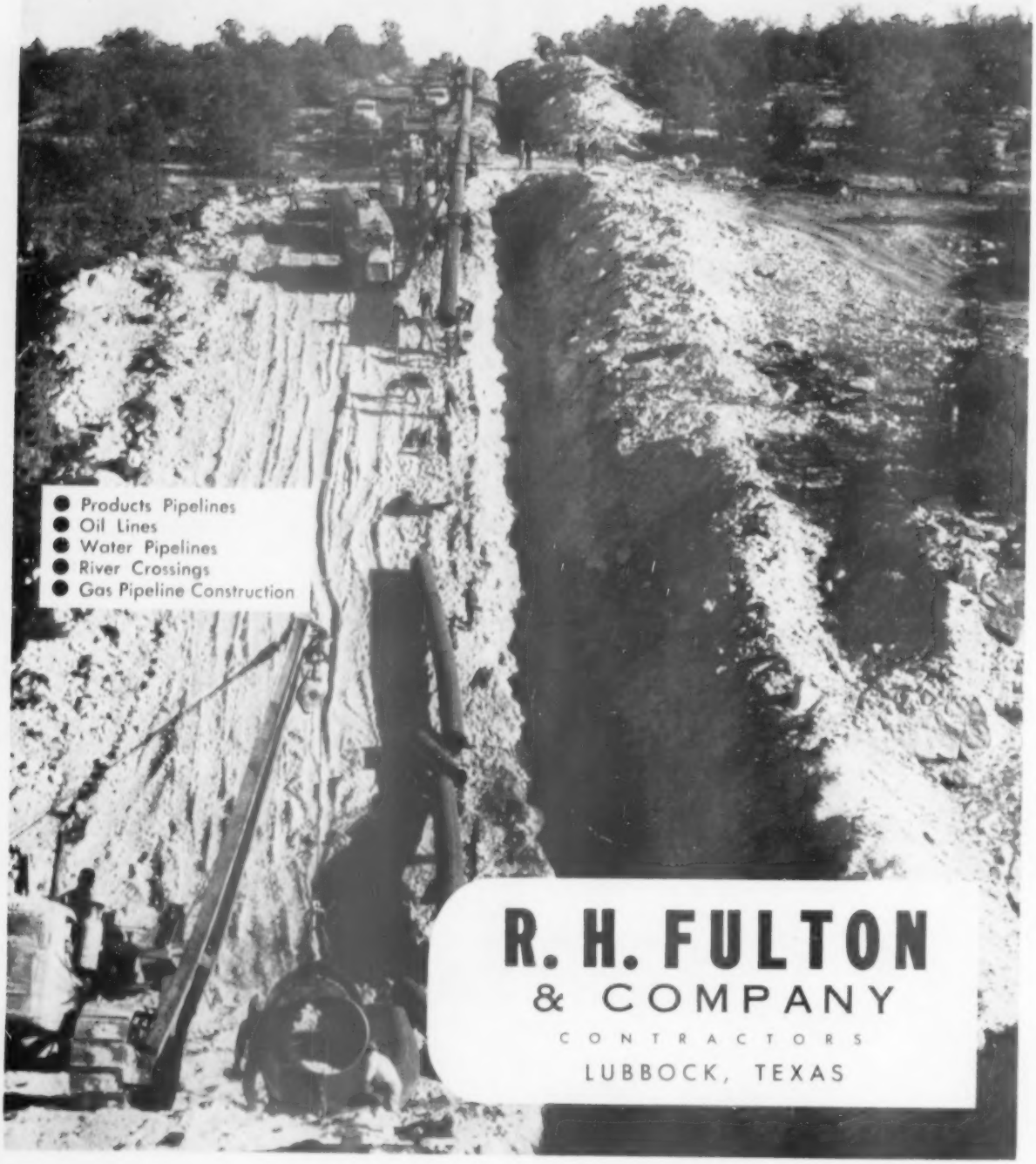

R. H. FULTON
& COMPANY
CONTRACTORS
LUBBOCK, TEXAS

Pipeline Patrol

. Report on Construction

No 8-hour day for this work horse

LIKE the construction crews and equipment which it supports, this helicopter also works long hours on a pipeline construction project. Being used by the H. C. Price Co. on a gas-transmission line job, this Bell Model 47D-1 'copter recently logged 11 hours and 15 minutes of flying time in 1 day. On this particular day over 730 miles were covered and, in doing so, the helicopter used only 134 gal. of gasoline.

The aerial jeep is used by spread superintendents and their foremen to keep tabs on all phases of the strung-out construction job. The extent of its use is evidenced by the more than 100 hours of flight time logged in the first 27 days of June. Besides serving for continuous inspection and communication flights, the versatile rotorcraft expedites the moving of parts and supplies to various crews ranging along the pipeline route.

Under Way, Contracted, and Planned . . .

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Arapahoe Pipe Line Co.—This company owned jointly by Sinclair and Pure has let contracts on a 494-mile crude line from Merino, Colo., to Humboldt, Kans. The contracts were let in the following sections:

Secton 1.—149 miles of 18-in. from Merino to Colby, Kans., R. H. Fulton & Co.

Section 2.—162 miles of 18-in. from Colby to Schurr Station, Kans., R. H. Fulton.

Section 3.—84 miles of 20-in. from Schurr Station to Burns, Kans., R. H. Fulton.

Section 4.—86 miles of 20 in. from Burns to Humboldt, Panama Williams Co.

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Interstate Oil Pipe Line Co.—River Construction Co. has contract to build 25 miles of 8 and 12-in. line from Little Lake oil field in Jefferson Parish, La., to Grand Isle on the Gulf of Mexico. Completion set for September 1.

Minnesota Pipe Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000 is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, pro-

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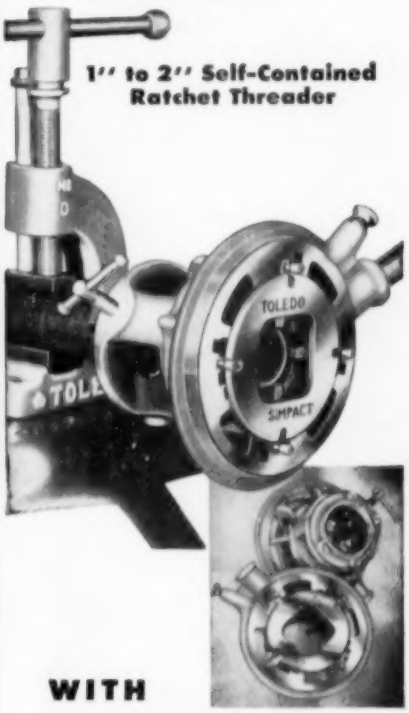

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PIPE HOLDER

★ *Improved* cam-type quick-action pipe holder has broader jaws for more positive grip on pipe.
★ Free action cam assures instant setting to any size—1" to 2".
★ Easy to center . . . you get perfect aligned threads.
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★ Accuracy proven through the years . . . dies recede along tapered steps. A fine quality tool—yet low in cost! Write for new catalog. Order through your supply house. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

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PIPE TOOLS..POWER PIPE MACHINES..POWER DRIVES

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EFFICIENT cleaning pays off in increased gas volume.

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EXPANSIBLE CLEANERS
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No need to experiment. Since 1941, TAPECOAT has proved its ability to keep vulnerable steel surfaces "like new" year after year. *That's why it is specified where continuing protection is the first consideration . . .* on pipe, pipe joints, tanks, etc. above ground and under ground. Available in handy rolls in widths from 2" to 24". Easy to apply. Cuts maintenance and replacement costs. Write for details and prices.

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Originators of Coal Tar Tape Protection
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Pipeline Patrol

posed, from Weston County, Wyoming to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. Cost: $3,500,000.

• **Orchard Pipe Line Co.**—45-miles, 8-in., proposed to transport crude from Masters field in Logan County, Colorado, to point 4 miles northwest of Orchard. Estimated cost: $811,250.

• **Pawnee Pipe Line Co.**—35 miles of 10, 8, and 6-in. line approved from Adena field in Colorado to Merino, Colo.

Shell Pipe Line Corp.—Houston Contracting Co. has contract to build 72 miles of 8-in. line from Hallettsville to Brookshire, Tex. Job includes crossings of Brazos and Colorado Rivers. H. J. Muckley is superintendent, H. L. Leake is spread superintendent. Work 75 per cent done as of August 20.

Trans Mountain Oil Pipe Line Co.—Company has awarded contract to Engineers Limited Pipeline Co. to build 15 miles of 20-in. and 11 miles of 16-in. line. Both lines run from Sumas, B. C., to General Petroleum's refinery which is being built at Ferndale, Wash. Completion set for September 1954.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. Size not yet determined. Engineering work under way.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. Rest of the work is expected to be let in August as pipe has already been yard-coated. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co. and The Texas Co).

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Great Lakes Pipe Line Co.—Company began a 714-mile expansion program at the beginning of Spring. First section of the program, 182-mile, 8-in., from Nebraska City to Doniphan, Neb., is finished. The remainder of the work is divided as follows:

127 miles, 8-in. from Iowa City, Iowa, to Prophetstown, Ill., to tie in with the Badger system there. M. R. Co. and Mid-States Construction Co. have the job.

188 miles of 12-in. from Kansas City to Des Moines. Midwestern Constructors, Inc., has 48 miles, R. H. Fulton & Co. 71 miles, and M. R. Co. has 69 miles.

83 miles of 12-in. between Alexandria and Rosendale, Minn., being done by Associated Pipe Line Contractors, Inc.

80 miles of 12-in. between Rosendale and Rosemount, Minn., being done by R. H. Fulton & Co.

105 miles of 8-in. from Alexandria to Fargo, N. D., being done by R. H. Fulton & Co.

Harbor Products System.—86 miles of 16-in. underway from Woodbury Junction to Tremley Point, N. J. Pipeline Construction & Drilling Co. is doing the work and completion is not definite because of right-of-way difficulties.

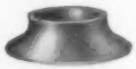
• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Oil Basin Pipe Line Co.—Midwestern Constructors, Inc., doing the work on this 230

See Composite and Refinery Catalogs, or Write for Folder On

FLEET-LINE®
PIPE SADDLES AND REDUCERS

Nozzle sizes from ¼" to 24" — ASTM A234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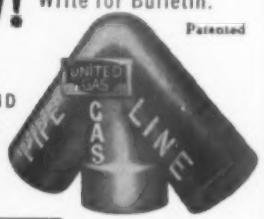

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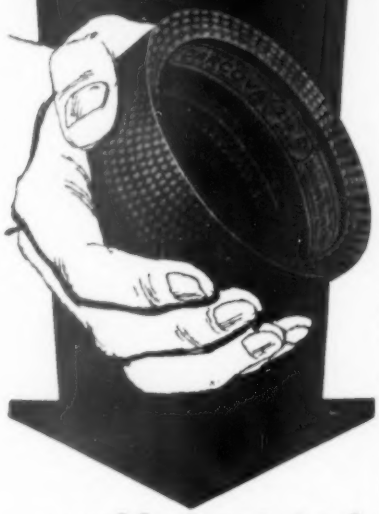

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THE ORIGINAL COMPOSITION CUP

WILLIAMSPORT 1, PA.

Pipeline Patrol

miles of 8-in. products line from Laurel to Glendive, Mont. Tentative completion date set for September 15. Cost: $5,350,000.

Phillips Pipe Line Co.—71 miles of 8-in. now out for bids. Company expects line to be completed in September. Job is between St. Louis and Chicago.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55. 200 miles completed July 15.

Wyoming-Nebraska Pipeline Co.—Houston Contracting Co. has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebraska. Work expected to be completed by October 1954.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 531 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54. Est. cost: $20,500,000.

Billings to Bozeman, Mont. Ross and Powers.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Helena to Clinton Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs Limited Pipe Line Co.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in. planned, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas. F.P.C. approved.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri. F.P.C. approved.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., FPC approved, Fayette, Ala., to Southern

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• abrasion • heat

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REXALLOY's exceptionally high wear-resistance makes it an ideal choice for oil well pump ball check valves . . . especially in gassy wells or wells with high sand, acid, alkali or salt content.

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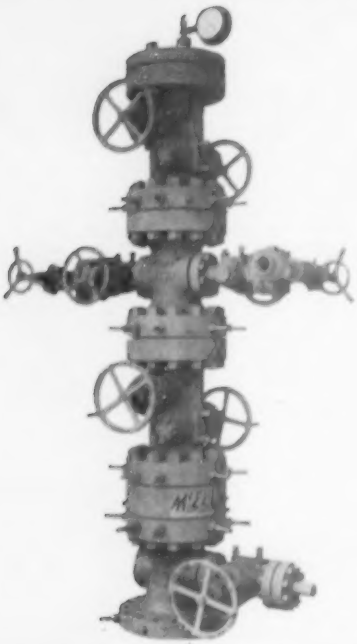

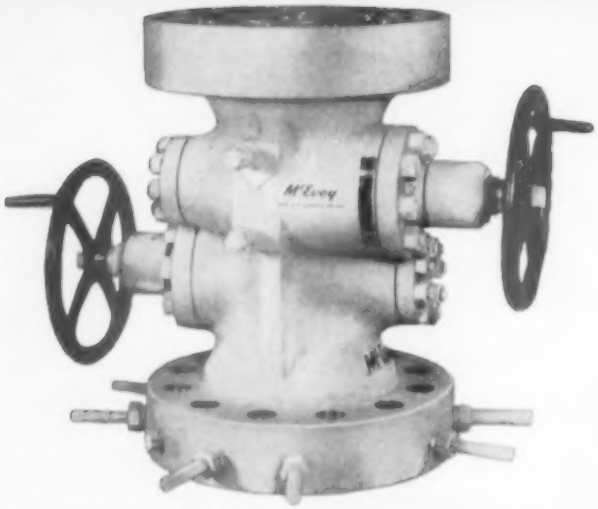

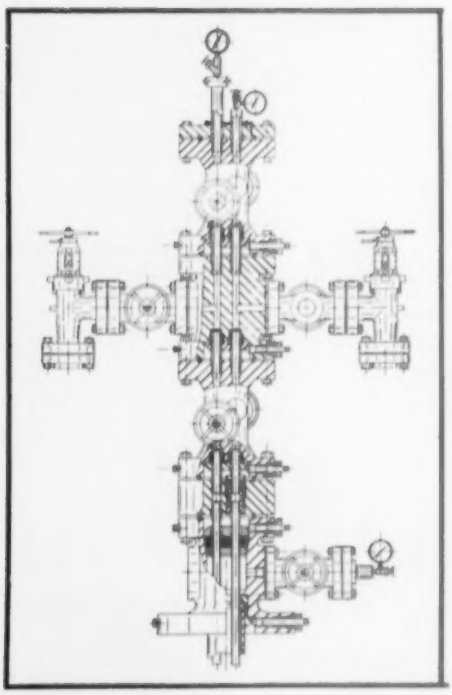

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Now You Can Complete New Wells, or Re-Complete Old Wells
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Pipeline Patrol

Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

Gulf Interstate Gas Co.—Company is winding up 860-mile, 30-in. job from Acadia Parish, La., to Boyd County, Kentucky.

• **Home Gas Co.**—Asking for bids on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Also asking for bids on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County Line, W. Va. Est. Cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build two natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.**—Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

Mid-South Gas Co.—Engineering Construction Co. of Tulsa has contract for 50 miles of various size pipe from Marion to Truman, Ark.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed. Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co. and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Midwestern Constructors has finished one job for this company consisting of 5 loops of 94.3 miles of 30-in. line in Texas, Oklahoma, and Kansas. Another job consisting of 6 loops, 94.9 miles of 30-in. line in Kansas, Nebraska, Iowa, and Minnesota is 75 per cent completed as of July 20.

93½ miles of 20-in. from Ogden to Waterloo, Iowa, being done by Hallmac Construction Co. of Houston.

90 miles of 16-in. from Waterloo to Dubuque, Iowa, being done by Engineering Construction Co. of Tulsa.

54 miles of 16 and 10-in. from Newton to Grinnell, Iowa, has been finished by G. G. Griffis Const. Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa,

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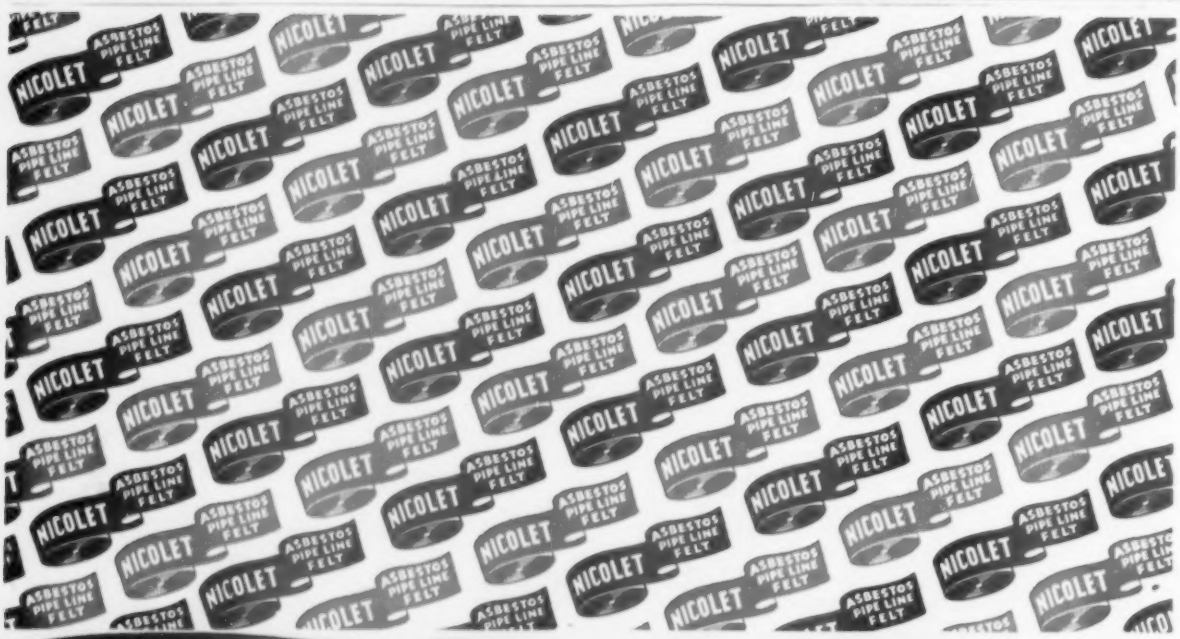

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Pipeline Patrol

and 20 and 24-in. lines from Paullina to Sioux City being done by R. H. Fulton Co.

Two underwater crossings totalling 5,100 ft. being done by Lone Star Constructors of Dallas.

G. G. Griffis also has 118 miles of 2-12-in. between Rochester and Redwing, Minn., for Northern Natural.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• 24½ miles of 20-in. line in Richland and Crawford counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in., planned, paralleling Topock-Milpitas line. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by F.P.C.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—Company has awarded following contracts on 566.8 miles of 30-in. line from Kinder, La., to Portland, Tenn.

98.7 miles from Kiner to U. S. Highway 84 near Jena, La., to Morrison Constructors, Inc.

90.2 miles from U. S. Highway 84 to Louisiana side of Mississippi River to Anderson Brothers Corp.

105 miles from Mississippi River to U. S. Highway 51 near Grenada, Miss., to Houston Contracting Co.

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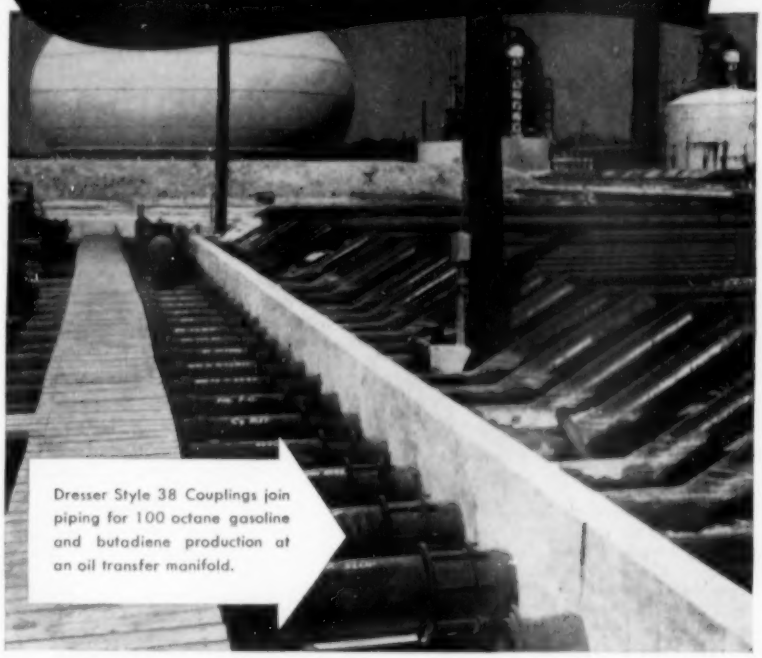

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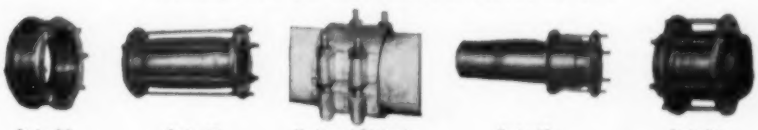

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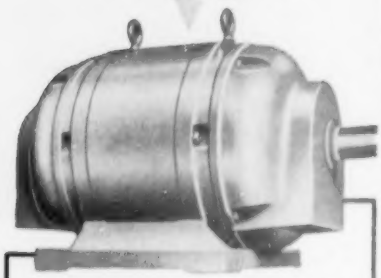

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45 near Corinth, Miss., to Oklahoma Pipe Line Constructors.

94.9 miles from U. S. Highway 45 to near Centerville, Tenn., to Western Pipe Line Constructors, Inc.

75.6 miles from Centerville to near Portland, Tenn., to Panama-Williams Co.

63 miles, 26-in., under way, loops in Ohio and Pennsylvania. H. C. Price Co.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catharines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 225-mile, 30-in. line from Castor, La., to Kosciusko, Miss., to connect with its existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Company has filed an application with the Federal Power Commission. Cost: $3,269,000.

Texas Eastern Penn-Jersey Transmission Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000. 54 miles let to H. C. Price Co. C. E. Shivel, superintendent.

• **Texas Gas Transmission Corp.** — 48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season. Work will resume September 15.

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feros Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 155 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Kerrobert station near Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished by November.

• **Pembina Pipe Line Co., Ltd.**—Company building 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co., and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isbthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

• **Petroleos Mexicanos.**—145 miles, 12-in., under way, Jose Colomo to El Plan, Mexico

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle M. W. Kellogg Co. Completion date February 1955.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in planned, Lagos to Guadalajara, Mexico.

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54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Foreign Natural-Gas Pipelines

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co. Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Union Gas Co. of Canada, Ltd.**—Proposed line from Lambton County gas-storage fields to Oakville. Line is being proposed now and will eventually join with proposed line from Alberta to Toronto and Montreal.

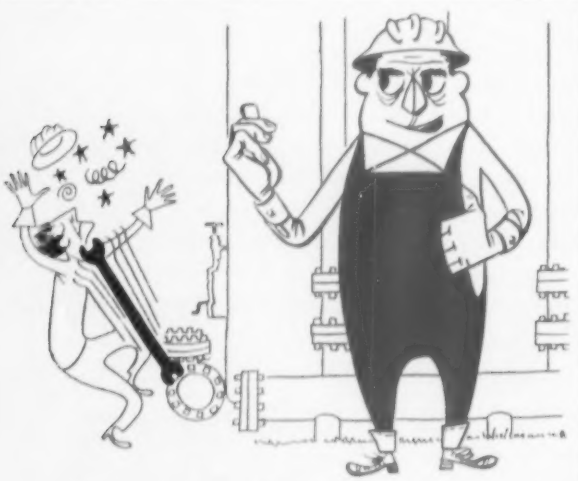
• **U. S. Navy**—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Western Pipe Lines, Ltd.**—Will build 80-mile, 20-in. line from Niagara Falls, N. Y. to Toronto. Gas will be furnished by Tennessee Gas Transmission and taken over in Toronto by Consumers Gas Co. Est. cost: $7,000,000. Canadian Bechtel, Ltd., doing engineering work.

BOOK

PRACTICAL PIPING FLEXIBILITY DESIGN AND FLOW. By W. A. Thomas. Published by the author, Pittsburgh. 190 pp., $25.

Engineers responsible for analysis of thermal stress and reactions in piping systems will find this book a great time saver in calculating proper piping specifications. The author, a Pittsburgh consulting engineer, has reduced the normal analytical procedures to a simple and practical method of approximation which includes safety margins. This method offers a quick and workable check that covers worst conditions as well as the unpredictable deviation of manufacture, erection, and operation. Heavily illustrated with graphs and charts, the book is prepared in ring-binder style to permit addition of new pages as they are published in future years.



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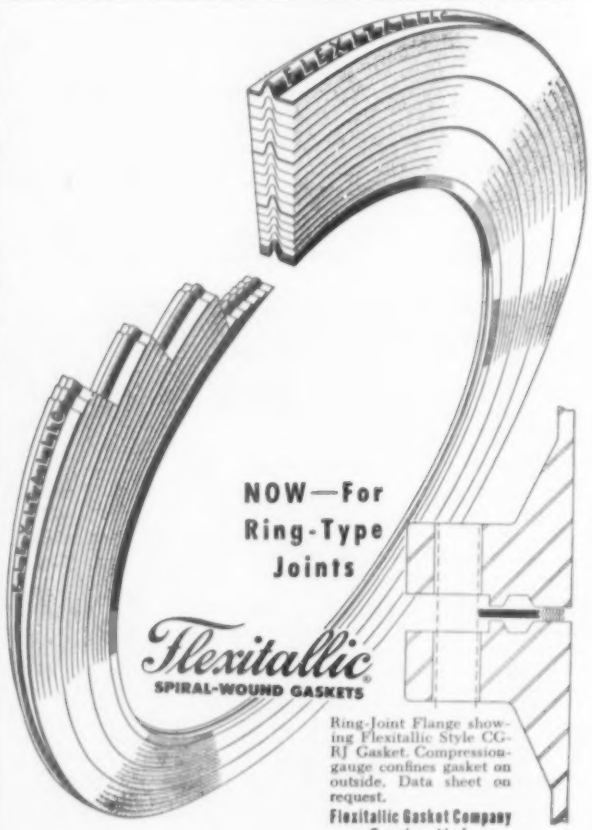

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The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

We do the rest

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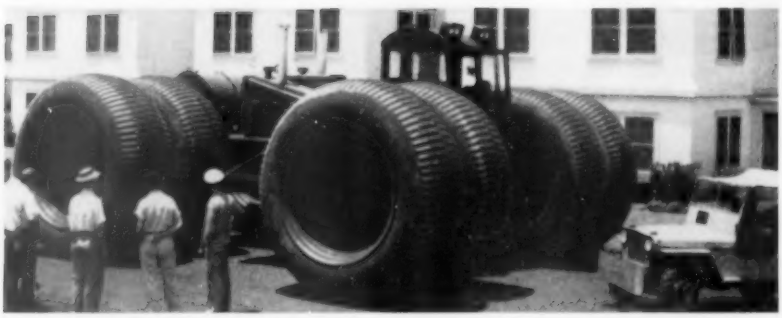
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller



Eight Tires Give Sno-Buggy Flotation

The world's largest rubber tires are ready to roll by electric power over snow, swamp, or desert on the electrically-powered and controlled Sno-Buggy. The first model of the exploratory vehicle and prime mover is on its way to the north country for tests through deep, powdery snow.

Eight of the big tires, each one 10-ft. high and 4-ft. wide are mounted dual-fashion on the four LeTourneau electric wheels, providing such a high degree of support and flotation for the 23-ton vehicle that they have been tested with only 5 lb. of air pressure during preliminary runs.

The Sno-Buggy has a 16-ft. width of rubber in contact with the ground at the front and rear of the machine. The wide rims for the dual wheels are made of aluminum. Aluminum also was used in several places on the chassis to cut down weight and increase buoyancy. The over-all width is 24 ft., and the over-all length is 27½ ft. Ground clearance is 3½ ft.

The operator easily controls the vehicle's travel, including steering, by small electric switches. The braking method is a regenerative electric system. For emergency stops and parking, there are spring-loaded, bimetallic friction brakes integrated with the wheel motors. They set automatically when the electric power to the motors is turned off. The speed on the rough going of deep snow, boggy swampland, or loose sand is 8 m.p.h., forward or backward.

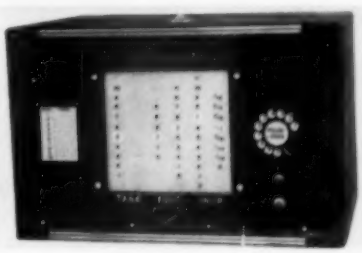
The power plant to turn the generator may be fueled by gasoline, diesel oil, or liquified petroleum gas. The operator's cab can be fitted for the Arctic or for the tropics. Provisions can be made for carrying cargo or pulling trailers. *R. G. LeTourneau, Inc.*

Check No. 1 On The Time Saver Card

●

Pulse-Code Telemetering Is Said to Be Error-Proof

The Varec pulse-code telemetering system uses the most reliable method of transmitting intelligence. This system utilizes a prearranged code for each increment of intelligence to be transmitted. The transmitter portion of the system sets up the code for the particular value of liquid level, or other information, and transmits this to the receiver portion of the system. At the



receiver, the incoming code is translated into the equivalent measurement increment. Each code is a distinct value. There are no borderline cases where the value may fall between two increments.

In the pulse-count system of telemetering, the number of pulses constitutes the intelligence. The loss or gain of one or more pulses results in a change in the information output—in many cases a very drastic change. Since the pulse-code system can use the same number of pulses for all values of the input, it is a simple matter to add pulse counting to the pulse-code-system receiver and in this way provide an indication as to whether the complete signal has been received. Unless the correct number of pulses are received, no reading will be displayed. Since the only conceivable signal error is either a loss or gain, the pulse-code system is errorproof with regard to transmission.

The pulse-code system is particularly adapted to remote liquid-level telemetering and supervisory control systems. The system can be used for the remote control of pump motors, control valves, and associated equipment. With this method, the complete dispatching operation, gaging, and remote control, is integrated in one common system. *The Vapor Recovery Systems Co.*

Check No. 2 On The Time Saver Card

●

Diesel-Engine Preheater Keeps Unit Ready to Start

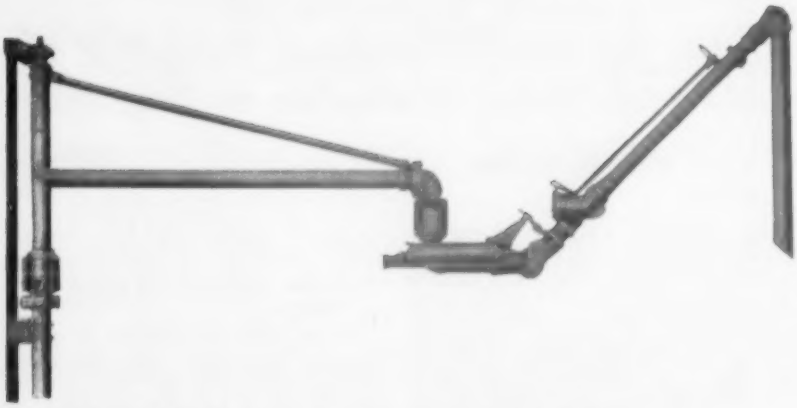
Kim Hotstart is an electric preheater for diesel and gas engines. The device plugs into any electrical outlet and through a percolator-like action keeps the engine ready for instant starting even when vehicles are stored outside in subzero weather.

The attachment is said to effect substantial economies in warmup time, engine wear and maintenance, battery life, fuel consumption, and storage space. *Kim Hotstart Manufacturing Co.*

Check No. 3 On The Time Saver Card

●

What's New... Use the handy Time-Saver Cards



Loader Eliminates Respotting Cars

Spring-balanced loaders of long-range specifications are capable of loading tank trucks and tank cars without respotting and with a long reach. Illustrated is loader No. 462, a custom-built assembly, which lends itself to variations in size, style, and length. It includes two of the recently perfected swing joints equipped with Timken tapered roller bearings.

These joints are packed with O-ring seals operating against heavy chrome surfaces to guard against leakage and wear. Repacking, without dismantling, takes less than 15 minutes for the complete assembly. The taper and wide area of the roller bearings give wide-area contact.

All parts and alignments of this new loader are engineered with precision-hardened ground bearings and races on all swing joints except the drop-tube joint. The latter joint provides 36° rotation of the drop tube and has a handle to facilitate handling. Vertical movement is spring-balanced and the loading arm remains in loading position without a locking device or manual effort. The assembly rises 60° above and descends 45° below horizontal. This loader includes a self-closing shockproof valve and a Timken bearing pillow block at top of the riser. All joints are grounded with static connections. *Oil Equipment Manufacturing Co., Inc.*

Check No. 4 On The Time Saver Card

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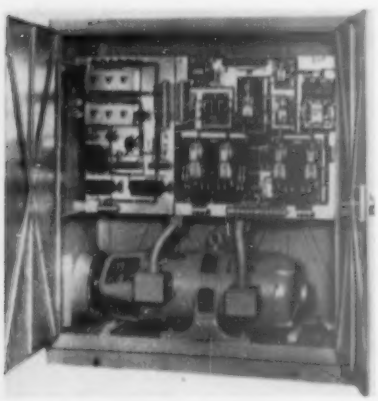


Selective-Speed Drive Covers Wide Speed Range

This selective-speed drive offers automatic control integrated with any process. It covers a wide speed range both forward or reverse, and controls one or more motors. With the selective-speed drive, the operator can often integrate speed changes to cycle automatically as process requirements dictate.

The speed change is automatically sensitive to changing temperature or pressure or to the viscosity of a mix. Many different kinds of control are available in the control circuit to change speeds, to jog, or to apply dynamic braking. *Century Electric Co.*

Check No. 5 On The Time Saver Card

●

4-Way Squeeze Gun Adds to Squeeze-Cementing Success

A shaped-charge, four-way perforator is designed to increase the chances of success of squeeze-cementing operations. There exists considerable evidence that the most effective type is that in which the formation is parted along bedding planes, fissures, or other zones of weakness, and the cement is forced into these lateral fractures to form a continuous sheet, or pancake, around the well bore.

By extensive tests, it has been demonstrated that the lateral spread of cement through a perforation is rather erratic, and averages only 140°. The new four-way Koneshot gun was developed to provide the optimum number of perforations in the same horizontal plane, and by providing the minimum vertical distance between shot groups, to concentrate cement pressure against bedding planes and thin strata. *Lane-Wells Co.*

Check No. 6 On The Time Saver Card

●

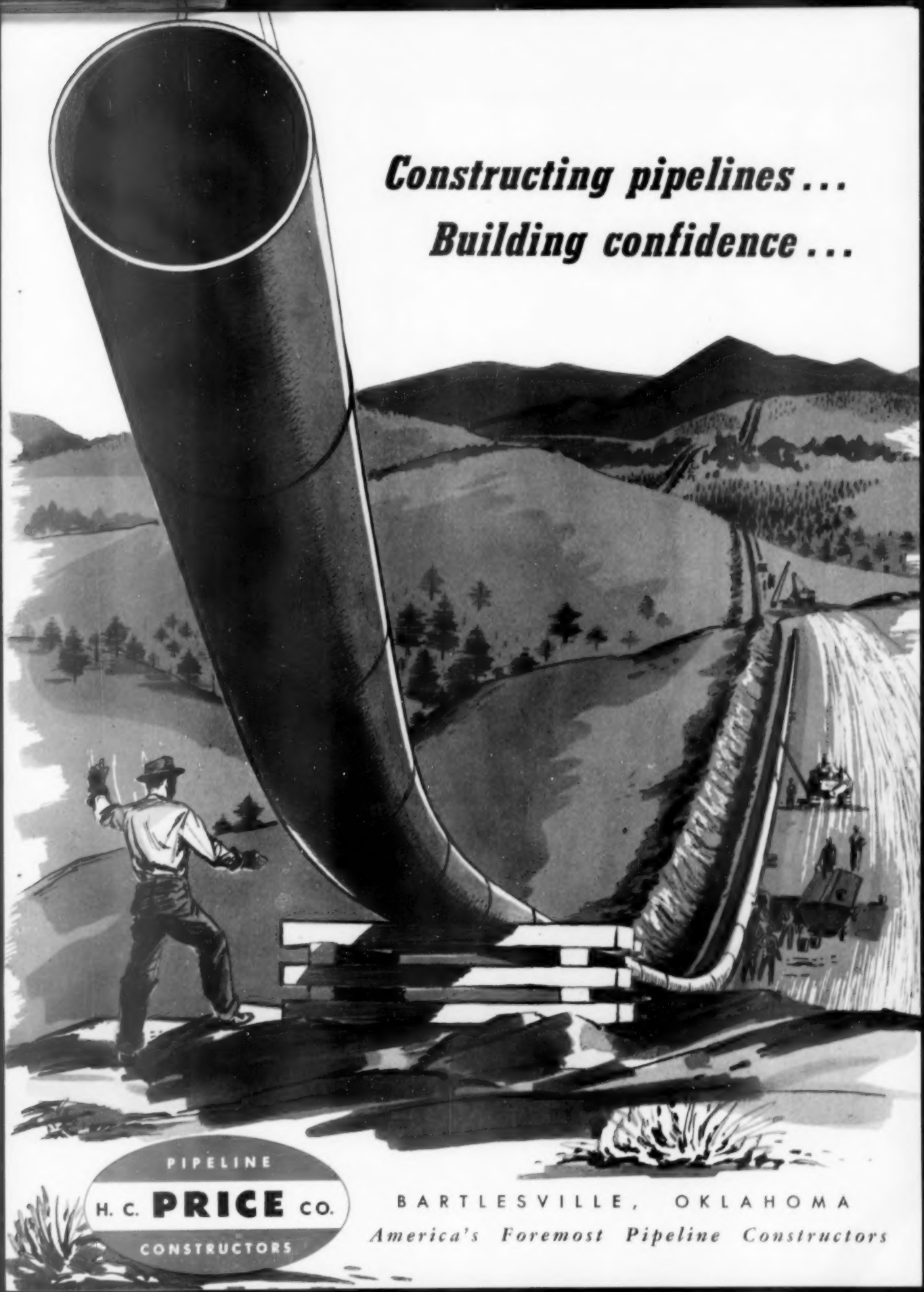
Log-Level Indicator Aids In Seismic Analysis

New Model LLI log-level indicator aids in seismic noise analysis and pattern-hole and multiple-seismometer shooting. The calibrated, electronic voltage-measuring and indicating instrument operates with any standard seismic system, receiving its input from the regular seismometer signals and furnishing output directly to the recording camera.

The log-level indicator is so named because its trace amplitude is proportional to the logarithm of the input signal. The LLI trace provides a calibrated indication of signal strength throughout the length of the seismograph record and is completely independent of automatic-gain control and other characteristics of the seismic amplifier.

The LLI shows effectiveness of various pattern-hole shots and multiple-seismometer spreads, and measures the level of noise before and after shooting. It is also of aid in determining methods of controlling spurious energy and determining the proper amount of explosive to use. *Houston Technical Laboratories.*

Check No. 7 On The Time Saver Card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Designed for highway moving, yet all full-size drilling rigs.

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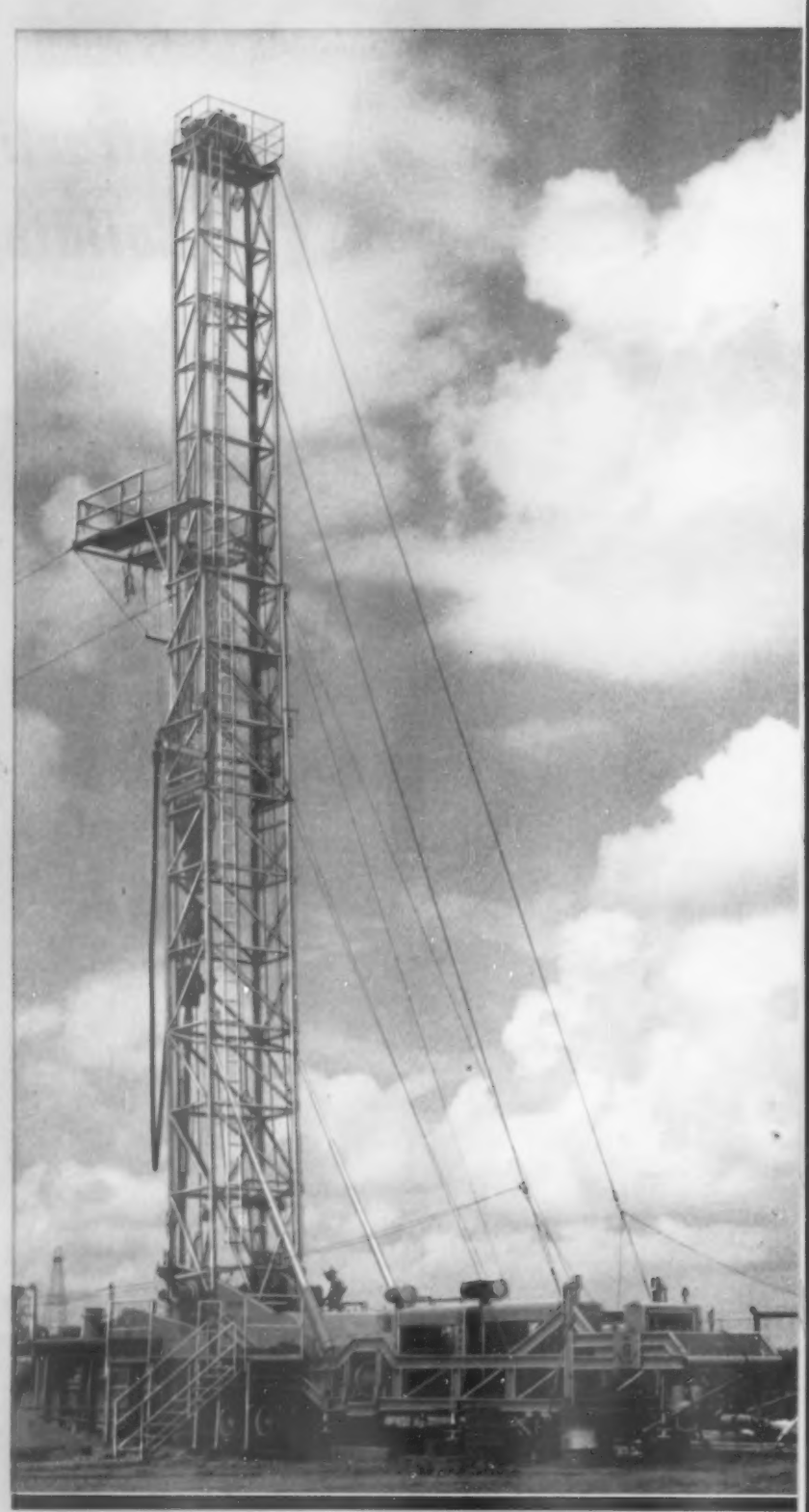
Can be spotted and mast raised in minutes—complete rig-up in 3 to 4 hours.

LOW IN COST
Compare the initial cost with any rig and you'll find more rig per dollar. Check your slim hole drilling rig requirements with CARDWELL. You'll be miles ahead in footage and thousands of dollars in profits.



CARDWELL "TRAILERIG" is best for 10,000-ft. slim hole drilling. Ninety- or 96-foot mast and twin-engine draw works are built into the trailer frame, making a complete, utilized rig.

CARDWELL 152 "TRAILERMAST" with 84-ft., 150,000-lb. capacity mast provides the maximum in movability and rig-up speed. Model AH or Model L single engine draw works can be mounted on trailer frame. Built-in hydraulic system erects mast.

CARDWELL 151 "TRAILERMAST" can be used with Model L, Super S, or Model D draw works, and is moved complete with lines and block reeved up. Ninety-six-foot mast with 150,000 lbs. capacity is raised by draw works mounted on trailer frame.

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What's New... Use the handy Time-Saver Cards

Portable Rigs Offer Fast Conversion

A new line of rigs has been designed for fast seismograph shot-hole, blast-hole, and water-well or core drilling with only minor adjustments required for each operation. The portable rigs are in two sizes and have been designated AR-1250 and AR-2000. An important feature is the standardization of air clutches in the drums. The clutches are of the double-plate air-tube type which require practically no maintenance, need no adjustment, and provide smoother operation.

Hydraulic torque-converter coupling and auxiliary transmission are used on the mud pump. Rigs have all chains and bearings operating in an oil bath and have all chains the same size to cut parts cost. This uniformity also extends to the hydraulic pistons and to all ring gears and pinion. *Drilling Accessory Manufacturing Co.*

Check No. 8 On The Time Saver Card

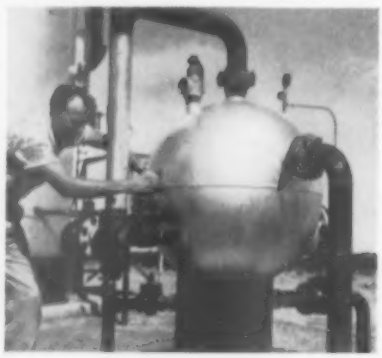
●

Spherical Separators Give High Capacity, Low Cost

Well fluids enter the vessel through the tangential-inlet diverter and are directed around the circumference of the sphere. The guide cylinder and ring force all oil and gas to first travel downward the short distance to the bottom of the guide cylinder where the gas emerges and moves toward the center of the sphere and upward toward the mist extractor. After passing through the mist extractor, gas enters the gas-outlet line and is discharged through a conventional gas back-pressure valve.

Liquid emerging from below the guide cylinder spreads out over the top of the liquid-accumulator compartment or float chamber and then moves to the inlet of the fluid accumulator. This inlet is below the liquid level in the separator, which eliminates agitation inside the float or liquid accumulator compartment and also provides a foam-free oil surface on which the float can ride. The accumulator compartment is vented to the top portion of the sphere through a vertical pipe so that liquid levels will seek their proper position.

Oil is discharged through a standard Kimray float-operated oil valve. The drain connection is attached to the center of the sphere's bottom and is installed so that it is flush with the



inside, thus allowing all water and other liquid to be drawn off periodically. The oil-outlet connection, however, is elevated a short distance above the bottom of the sphere so that mud, silt, and gravel will not be so apt to go through the oil valve and interfere with its operation. *Sivalls Tank, Inc.*

Check No. 9 On The Time Saver Card

●

Power Box is Frame of New Half Yard Crawler Machine

Model 155 is an entirely new ½-cu. yd. crawler machine. Its simple power-box construction, which contains all driving machinery in a minimum of space, is built of inch-thick steel plate, all welded into a rigid unit. Oil-tight, the power box is so sturdily built that it actually forms the machine frame and supports all shafts, drums, engine, counterweight, and work attachments. This new concept of machinery placement provides unusual accessibility to all working parts.

The Model 155 is an all-purpose machine. Fully convertible as a shovel, hoe, clamshell, dragline, and crane and magnet, all front-end attachments are engineered for fast, simple change-over. It is of all-welded construction for maximum strength without excess weight. True tractor-type crawlers provide excellent mobility with fine maneuvering qualities. Track tension is maintained by a fully enclosed compensator spring.

Power may be either gasoline or diesel. Driving is through a four-speed transmission and universal joint to the worm-drive pinion and gear in the power box. Large brakes and clutch areas are provided with cooling fins, and each drum has a permanent oil recession. *Harnischfeger Corp.*

Check No. 10 On The Time Saver Card

●

New Meter Is One of Largest in Industry

The new Model M-200 is described as the largest meter in the industry. The heavyweight has a rated capacity of 2,000 g.p.m. under a working pressure of 1,200 psi.

Although this complete meter weighs 6,275 lb., the inner metering unit tips the scale at only 800 lb. Principal use of the M-200 will be on high-pressure product and crude-oil lines. *A. O. Smith Corp.*

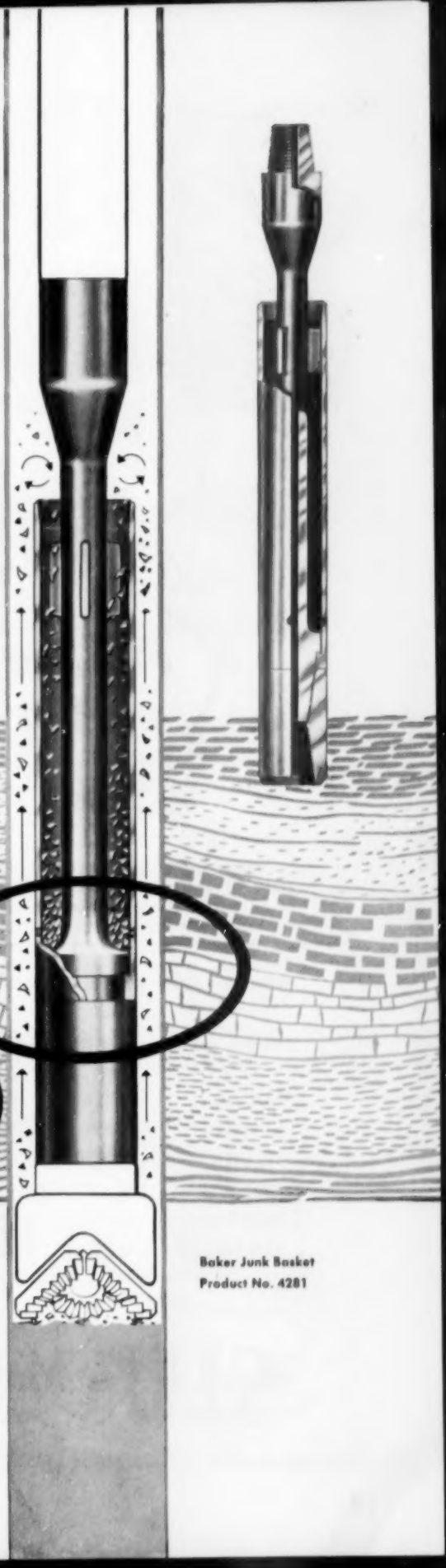
Check No. 11 On The Time Saver Card

THE BAKER JUNK BASKET safely traps, retains and removes from the well cuttings from "drilled-out" cast-iron, aluminum alloys, bronze or other dense, but "drillable" materials. Its design is simple and sturdy, and is readily understood by referring to the sectional illustration (upper right). Between the short Drill Collar (top) and the Drill Collar Sub (bottom) a Cylinder is mounted to provide a basket for trapping a considerable quantity of metal cuttings. When drilling out Baker Cement Retainers, Baker Bridge Plugs, Baker Production Packers, or other devices made of cast iron, aluminum alloys and similar "drillable" materials, a Baker Junk Basket (Product No. 4281) is positioned just above the rock bit, or diamond point bit.

SIMPLE, POSITIVE OPERATION—Cuttings from the drilling bit are carried upward by the high velocity of the circulation fluid through the comparatively small annulus around the Cylinder (see illustration). Now note how the annulus is *abruptly enlarged* due to the smaller diameter of the Drill Collar. When the circulation fluid reaches this enlarged annulus the velocity of the fluid is so greatly reduced that the cuttings are no longer carried upward, but drop into the basket (Cylinder) where they are trapped and recovered when the Junk Basket is removed from the well.

catch those metal cuttings with a---

BAKER JUNK BASKET



Baker Junk Basket
Product No. 4281

AVAILABLE IN POPULAR SIZES—The Baker Junk Basket is furnished to make up in 2⅜" to 4½" A.P.I. drilling strings to run in 4½" to 9⅝" A.P.I. casing. Any Baker representative or office will recommend the proper size for your needs, and see that you are supplied promptly on a low-cost rental basis. Specifications for purchase by overseas operators can be found in the BAKER (or Composite) CATALOG.

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Facts On a New Breed of Tractors is a 16-page brochure covering construction features and job applications of a full line of crawler tractors. The line includes ranges in capacity from 40 drawbar horsepower to 175 net horsepower at flywheel. *Allis-Chalmers Tractor Division.*

Check No. 12 On The Time Saver Card

Power Mate Variable-Speed Liquid Drive. Bulletin 7020A contains schematic and dimensional drawings in addition to halftone illustrations of these water or oil-operated units. Both capacity and dimension tables are presented on the center-page spread. *Liquid Drive Corp.*

Check No. 13 On The Time Saver Card

Dell Protective Coatings. A new, 12-page, descriptive folder contains data on coatings designed to de specific jobs in the processing industries, on new construction, in maintenance work, and on product finishes. Of particular interest is primer P-9 which has been designed for use as a general maintenance primer on wire brushed rusty metal or over old paints. *David E. Long Corp.*

Check No. 14 On The Time Saver Card

Trouble Savers. Locating troubles in vertical water-cooled compressors is the subject of this new folder. It is one of a series of preventive-maintenance bulletins offered users to assist in reducing operation costs. Graphically illustrated, it clearly explains reasons for such operating troubles as failure to deliver air; insufficient capacity; insufficient pressure; vibration; overheating; overloading motor; knocks; and low or high intercooler pressure. *Worthington Corp.*

Check No. 15 On The Time Saver Card

Rotary Swivels. Brochure 140/000/51 contains specifications, line drawings, and half-tone illustrations of a series

of rotary swivels ranging from 45 to 200 tons in carrying capacity. A complete parts diagram and list are included. *Alfred Wirth & Co.*

Check No. 16 On The Time Saver Card

●

Reduce Drilling Costs With Caterpillar Oilfield Engines. Less risk for drilling contractors is the topic of this new booklet. Included in Form No. D440 are pictures and descriptions of drilling operations in Louisiana, Colorado, Texas, Alaska, Montana, Canada, and the Gulf of Mexico. In addition, the booklet contains testimonials by drilling contractors on their experience with Cat engines. *Caterpillar Tractor Co.*

Check No. 17 On The Time Saver Card

●

Tips for Steel Valve Users. This technical booklet describes and illustrates data gathered by the Edward laboratories on valve material, installation, and usage. Subjects discussed include "What Heat Does to Valve Trim Hardness," "What Thermal Expansion Does to Valve Materials," "Use of Globe Valves for Throttling Service," "High-Temperature Lubricants for Valve Studs and Bushings," and "Creep Robs Metal Strength at High Temperatures." *Edward Valves, Inc.*

Check No. 18 On The Time Saver Card

●

Leutert Well Testing Instruments. Complete data on a pressure recorder, a temperature indicator, a dead-weight tester, a clock test assembly, a calibrating-bath thermostat, a chart-measuring microscope, and a measuring governor unit are presented in this illustrated and perforated brochure. *Haniel & Lueg G.M.B.H.*

Check No. 19 On The Time Saver Card

●

Rock Bits. Catalog 82 illustrates a complete line of twin jet rock bits and carries a table of formations each bit is designed for. There is also a table of weights in pounds per foot for drill collars. A chart of equivalent bits is inserted for comparisons with bits of American manufacture. *English Drilling Equipment Co., Ltd.*

Check No. 20 On The Time Saver Card

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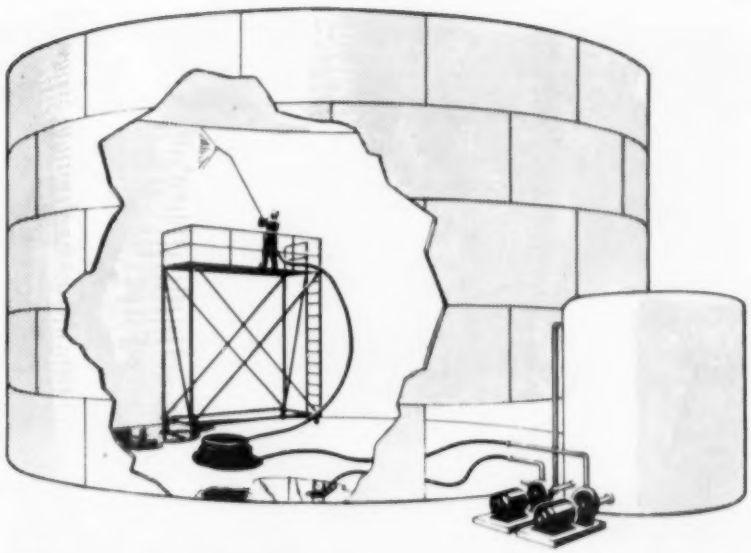
Ball-Bearing Swivel Joints. This new industrial Catalog G-4 covers the line of ball-bearing swivel joints and other products, including loading racks, manifolding lines, and all-metal marine and barge hose manufactured by the firm.



How a refinery cut storage tank cleaning costs by MORE than 75%

PROBLEM: Find a low cost method of cleaning an 80,000 gallon petroleum storage tank. Previous manual cleaning method was slow, wasteful, making costs extremely high.

SOLUTION: Utilizing standard equipment such as solution tank, pump, hose, piping and scaffolding (constructed from scrap) they set up a spray method using recommended Oakite solvent detergents. Entire installation constructed from working drawing supplied by Oakite Technical Service Representative.

RESULTS: By eliminating scrubbing, brushing and other manual cleaning methods, entire inside surface of storage tank was cleaned in only 12 hours. *And at 1/4 of their former costs.*

SEE PAGE 19 of the information-packed handbook, "What Petroleum Men Should Know to Simplify Cleaning," for complete details of cleaning and paint stripping storage tanks. This guide is loaded with facts that can help petroleum men realize greater savings in time and money on many maintenance cleaning operations. It's FREE on request. Write Oakite Products, Inc., 44C Rector Street, New York 6, N. Y.

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"Pay for themselves faster than most of our other equipment!" That's what R. Mannino & Sons, Westfield, New Jersey general contractors say about their Sherman Power Diggers.

A typical Mannino job was for the local gas company. Replacement of clamps and seals on gas mains required digging a series of bell holes. The Sherman Power Digger reduced digging time for the average bell hole to about fifteen or twenty minutes, making it possible to replace as many as twenty clamps a day.

If you now excavate by hand, or if your heavier equipment cannot work in tight spots, you, too, will find the versatile Sherman Power Digger practical and profitable. It's compact, flexible, fast, easy to operate. It digs in a fraction of the time and cost of manual labor—as deep as 10′ below grade in mud, hard-pan, shale, oiled roads, blacktop and stony ground.

Initial cost of the Sherman Power Digger is surprisingly low, maintenance simple and inexpensive. Write today for the whole story. Ask for Bulletin No. A15.

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In addition to providing dimensional and operating data on these products, typical industrial applications for the equipment are illustrated. *Chiksan Co.*

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●

For Fast, Effective Mud-Loss Control is the title of a four-page brochure describing Jelflake, a lost-circulation material. The brochure lists the advantages of Jelflake and illustrates its use in stopping loss of mud in a thief zone. A series of six case histories are condensed on the last page. *Dowell Incorporated.*

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How Flange-Surface Finishes Affect Gasket Sealability and Joint Performance is the latest of a series of illustrated technical bulletins on gasket use. The new bulletin provides a basis upon which to select the flange-surface finish most suitable for a given gasket. It explains why the right finish makes it easy to achieve an initial seal and obtain the best joint performance in service. *Johns-Manville.*

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Low-Pressure Horizontal Separators Model H. C30-09 describes the low-pressure horizontal separator, designed for maximum separating capacity at minimum cost and minimized freezing problems in cold weather. The Model H handles high liquid capacity and foamy oil. *Black, Sivalls & Bryson, Inc.*

Check No. 24 On The Time Saver Card

●

Aioc Desulfurization Process is the subject of Kelloggram No. 2. Autofining is a desulfurization process developed by the Anglo-Iranian Oil Co., Ltd. Autofining has been applied successfully to straight-run petroleum distillates in gasoline to diesel fuel range, gasoline and kerosine fractions being almost entirely desulfurized with little loss to gas and coke. *The M. W. Kellogg Co.*

Check No. 25 On The Time Saver Card

●

Hydraulically Operated Casing Scraper. This new literature covers the operation of a new casing scraper with a new method of actuation designed so that the scraper blades assure complete coverage of the casing interior. *Bowen Co. of Texas.*

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●

EQUIPMENT MEN . . . in the News

United Supply Opens Store at Caney, Kans.

W. L. MORTER

The opening of a new store at Caney, Kans., by United Supply & Manufacturing Co., has just been announced by Brooks Gutelius, Jr., president.

W. L. (Jack) Morter has been appointed store manager at the new location. Morter joined United Supply in 1950 and has served the company in Hutchinson and Great Bend, Kans. He has been associated with the drilling and supply business since 1940.

United Supply now operates 23 supply stores in Oklahoma, Kansas, New Mexico, Texas, and Louisiana. It also maintains 11 offices in the same states.

Martin-Decker Appoints Foreign Representative

P. M. BOWEN

The appointment of P. M. (Shorty) Bowen to the newly created position of foreign representative, has recently been announced by E. L. Decker, president of the firm.

Bowen is well qualified for his post, having spent 33 years in the oil business as a driller, well shooter, and tool pusher. Many of these years were spent in South America.

Protective Coating Opens Houston Headquarters

The opening of a new headquarters in Houston has recently been announced by Protective Coating Engineering & Inspection Service. Warren D. Palmer heads the new service firm. He has served as field engineer on construction for The Austin Co. and for Ford, Bacon & Davis.

For the past 12 years, Palmer has been an employe of Monsanto Chemical Co. at the Texas City plant. For the last 6 years he worked as inspector and protective coating engineer in the corrosion and engineering section.

The new company offers a complete engineering service for protective coatings. Included are the evaluation of paints and coatings in actual plant exposures, surveys of painting and paint practices, and preparation of complete painting specifications and schedules.

Clarke Heads Leschen Wire Rope Sales

L. J. CLARKE

The appointment of L. Jack Clarke as general sales manager, Leschen Wire Rope Division, H. K. Porter Co., Inc., has been announced by D. W. Vernon, vice president and general manager of Leschen.

Clarke has served the Leschen organization as field representative in the New Orleans area and as manager of the New York sales district. He will make his headquarters at the division's main offices in St. Louis.

Underwood, Franklin Named To Mud Products Staff

The appointment of W. R. Underwood and Frank D. Franklin, Jr., to the sales staff of Mud Products, Inc., and its associated companies, Beaumont Cement Sales Co. and The Bomud Co., was recently announced by E. R. Albert, Jr., president of the companies.

F. D. FRANKLIN

UNDERWOOD

Underwood, formerly associated with Mid-Continent Supply Co., will act as sales representative for the companies out of the Houston office headed by A. R. Parker. Franklin, who will be city sales representative out of the New Orleans office of Beaumont Cement, was formerly senior engineer at Houma, La., for Baroid Sales Division.

Oilwell Makes Sales Staff Changes in Mid-Continent

The appointments of E. Wayne Alexander as area merchandise manager at Oklahoma City, and of Otha V. Coke as district representative at El Dorado,

ALEXANDER

O. V. COKE

Kans., have been announced by Mark Barkhurst, Mid-Continent area manager for U. S. Steel's Oil Well Supply Division.

Alexander was employed in 1937 at Oilwell's Oklahoma City store. In 1944 he was transferred to the division's store at Cushing, Okla. He later served at Russell, Kans. as store manager. In 1951 he was transferred to the Mid-Continent area office at Tulsa as quotation-pricing specialist. From Tulsa he was transferred to the Oklahoma district office at Oklahoma City as assistant to the district merchandise manager, holding his position until his present promotion.

Coke joined Oilwell in 1951 at the Oklahoma City store. The following year he was named junior engineer at Oklahoma City and in 1952 he became field representative at that city. In 1953 he was appointed assistant district engineer, machinery equipment sales, at Oklahoma City—the position he held until his present appointment.

Lane-Wells Announces Supervisory Changes

The following supervisory appointments in the Gulf Coast area have been made by Lane-Wells Co., according to Rodney S. Durkee, president.

Oliver J. Guseman, formerly assistant to the Gulf Coast division operating superintendent, has been appointed assistant Gulf Coast division operating superintendent. John C. Wilson, formerly assistant to the Gulf Coast division radioactivity engineer, has been named assistant Gulf Coast division radioactivity engineer.

Courtney J. Ritchie, formerly dis-

trict sales engineer at Abilene, Tex., has been appointed district sales engineer at Gainsville, Tex., and has been transferred to that location.

Export Representative Named by McKissick

McKissick Products Corp. has announced the appointment of D. T. O'Connor, New York City, as its export representative. He will handle all export business with the exception of Canada. He will merely act as representative, with shipping and invoicing being handled by the Tulsa office.

LeBus Appoints Galien As Factory Representative

L. (Smokey) Galien has been appointed factory field representative for LeBus Rotary Tool Works, Inc. Galien, who has been associated with the oil industry for 27 years, started as a roughneck with Slim Pierce Drilling Co. in 1926 and worked for that company as a driller and tool pusher until he joined the staff of Brown Oil Tool Co. in 1941.

With Brown, he served as district manager for that company's Ark-La-Tex area until joining the staff of McCullough Tool Co. in 1953. In his new capacity with LeBus, Galien will make his headquarters at the LeBus main plant in Longview, Tex.

Welex Opens District Office at Lafayette

H. F. BELEAU

Welex Jet Services has announced the availability of Welex services to oil producers throughout Louisiana through the opening of an office in Lafayette, La.

The new station is under Harold F. Beleau, recently named Lafayette district manager by Welex. Beleau has had 15 years of experience in oil-well service work. Jimmie R. Neill, assistant district manager of the new station, has been with Welex for 3 years. Prior to his new assignment, he was sales engineer with the Welex Corpus Christi district.

K. E. Davis Elected B. S. & B. Controller

K. E. DAVIS

Keith E. Davis has been elected controller of Black, Sivalls & Bryson, Inc., according to an announcement made by Kenneth W. Lineberry, president.

Davis will be responsible for all the accounting activities of B. S. & B. and its subsidiary companies, Black, Sivalls & Bryson, Ltd., and Zenite Metal Corp. He will headquarter at the Kansas City general offices.

Joining B. S. & B. in 1951, Davis has been assistant controller since that time, and has been acting controller of the company since April 1954. He had previously been associated with Ernst & Ernst as senior accountant.

G. M. Official Tours Canada

Arch F. Campbell, manager, petroleum industry sales, Detroit Diesel Engine Division, General Motors Corp., left his headquarters in Tulsa recently

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240-lb. barrels
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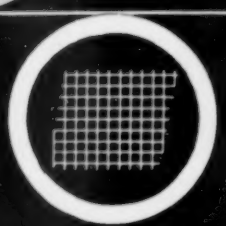

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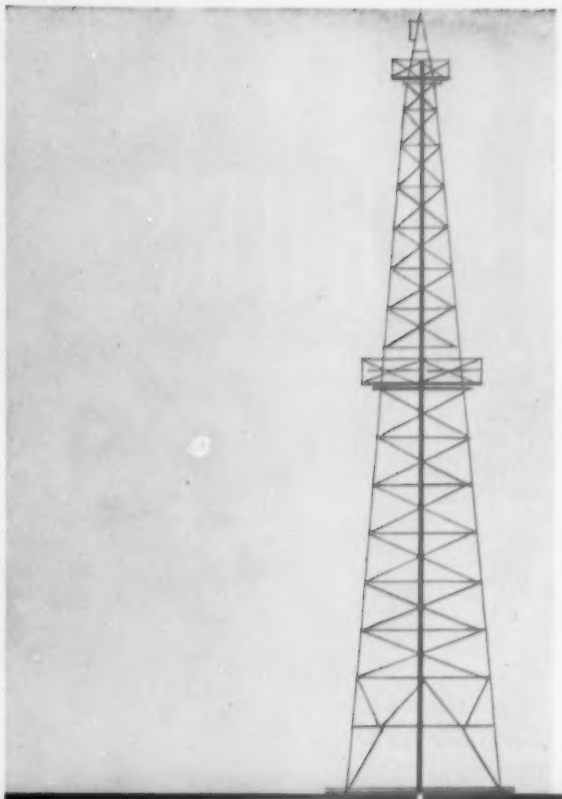

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FIFTEEN MILLION DOLLARS

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OIL

is our business, too

for a tour of oil fields and petroleum-industry installations in Canada. His trip will take him through oil country in Alberta and Saskatchewan provinces.

Bracewell Elected Head of Rig Maintenance Supply Co.

The election of L. M. Bracewell as president of the newly reorganized Rig Maintenance Supply Co. was recently announced by officials of the Houston firm.

The company will offer complete field and shop repair services on drilling rigs and diesel power systems throughout the Gulf Coast oil-producing area.

Bracewell, a mechanical engineer graduate of Texas A. & M. College, joined Rig Maintenance after leaving Security Engineering Co. where he was Gulf Coast district engineer. Prior to his employment with Security, he was Houston district manager for Welex Jet Services.

Harris Made Mid-Continent Great Bend Salesman

C. C. HARRIS

C. C. Harris has been made district salesman in Mid-Continent Supply Co.'s Great Bend, Kans.,area, according to an announcement by Ken W. Davis, president.

Harris joined Mid-Continent in 1948, starting at the Great Bend store. Later he served the company at Plainville, Kans., as store manager. In 1953 he returned to Great Bend as store manager.

In addition to his experience with Mid-Continent, Harris has 11 years' experience with other oil and oil-field supply companies.

Oilwell Makes Changes in Central Midwest Area

The following changes have been made in U. S. Steel's Oil Well Supply Division, according to William Miskimins, manager of the Central Midwest area.

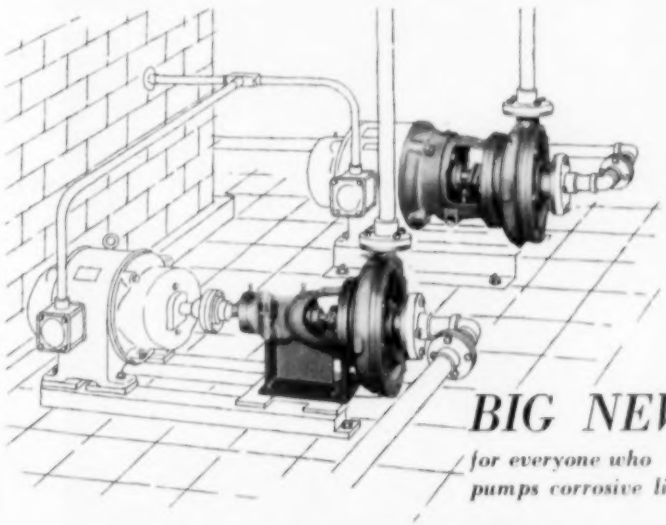
Frank W. Bruner, Jr. has been made manager of the Shreveport, La., store, and Ray F. Dillon manager of the Kilgore, Tex., store. James O. Donaldson has been given the same position for the Odessa, Tex., store. Frank E. Hankinson was appointed field representative at Hobbs, N. M. Benjamin F. McIntosh, Jr. and Daniel F. Shields have been promoted field representatives at Gainesville, and McCamey, Tex., respectively.

Bruner was employed by Oilwell in 1946 at the Greggton, Tex., store. Since that time he has held various sales and managerial positions in the supply concern's East Texas, North Louisiana, and Arkansas district. Dillon has been with Oilwell since 1934. He joined the firm at the Beaumont, Tex., store.

Donaldson, formerly city representative at Midland, Tex., has previously served as a salesman at Monahans, Tex., and as district representative at Odessa. He became city representative at Midland in December 1953.

Hankinson has been located at Odessa since he joined the organization in 1953. McIntosh, who joined Oilwell at Graham, Tex., in 1952, transferred to the Gainesville store in 1953.

Shields joined Oilwell in 1953 as a junior engineer at Odessa, where he was located until his promotion to the McCamey post.



BIG NEWS...

for everyone who pumps corrosive liquids

Now you can get the **"custom-built"** *features you want at no penalty with the new*

AMPCO* Centrifugal Pump

In a given pump size, new standard units give at least 108 different combinations, plus maximum resistance to corrosion, erosion, cavitation

This new 1750 rpm pump, available in flows up to 600 gpm, can be built to *your* special requirements by interchanging standard parts.

You can select the bearings you want — sealed, replenishable-grease, or oil-lubricated.

You can choose your shaft seals—inside or outside mechanical seals; internal, external, or flushing packed stuffing-boxes.

You can get the exact shaft you need — no compromising. Take your choice of general-purpose and extra-rigid shafts as well as a new two-piece unit that allows removal of the rotating parts without disturbing coupling, bearings, or alignment.

You can select the pedestal height and type impeller you want.

Best of all, you don't have to buy another pump when conditions change. You can make modifications quickly and inexpensively in the field — save yourself valuable time and money.

P-13A

Corrosion damage? Forget it. These pumps are built entirely from Ampco or other workable alloys to combat the effects of corrosive acids, alkalis, organic chemicals, etc. And these pumps have many new design features — features that contribute to dependable, maintenance-free pumping.

The new Ampco 1750 rpm Pumps are now stocked for immediate delivery. Contact your Ampco Pump Distributor or Field Engineer or mail the coupon.

*Reg. U. S. Pat. Off.

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You've reached potential pay and cored the section. Now comes the big question – *pay out or play out?* . . . After thousands of dollars and months of effort have been spent to accumulate acreage, drill an exploratory well, and core a probable productive formation, sound business practice demands *good core analyses* . . . and the reliability of these data can be assured by the experience and technical background of the organization performing the work . . . If your best efforts deserve the best possible answer, take advantage of Core Lab's eighteen years' experience in all active areas.

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EXPLORATION

Gulf Coast Enjoying Robust Maturity

by Frank J. Gardner

SINCE 1950, the Texas Gulf Coast has entered a settled stage of development, marked by no really new methods or approaches and few discoveries of significance. One might refer to it as a period of review and reappraisal, with a discovery record largely confined to a succession of new pays and extensions within known fields and on long-known salt domes.

It is a period of creative thinking and discovery speculation. Imagination is the geologist's scepter of discovery, and in recent years his flights of fancy have centered on the future possibilities of this prolific oil province. Where does its discovery destiny lie?

Real future onshore . . . If we were asked to tag this period on the basis of developments to date, there is little doubt that it would involve the words "offshore" and "deeper drilling onshore." The offshore campaigns are a thing unto themselves, but it is essentially the onshore phases of exploration activity that will determine the discovery future of the Gulf Coast.

In 1951, the Houston Geological Society prepared a paper in which it referred to the Tertiary deposits between depths of 10,000 and 15,000 ft. as a "future oil province" for the Texas Gulf Coast. At the same time, the zone of deposits between 15,000 and 20,000 ft. was categorized as "so speculative it cannot now be considered a possible oil province."

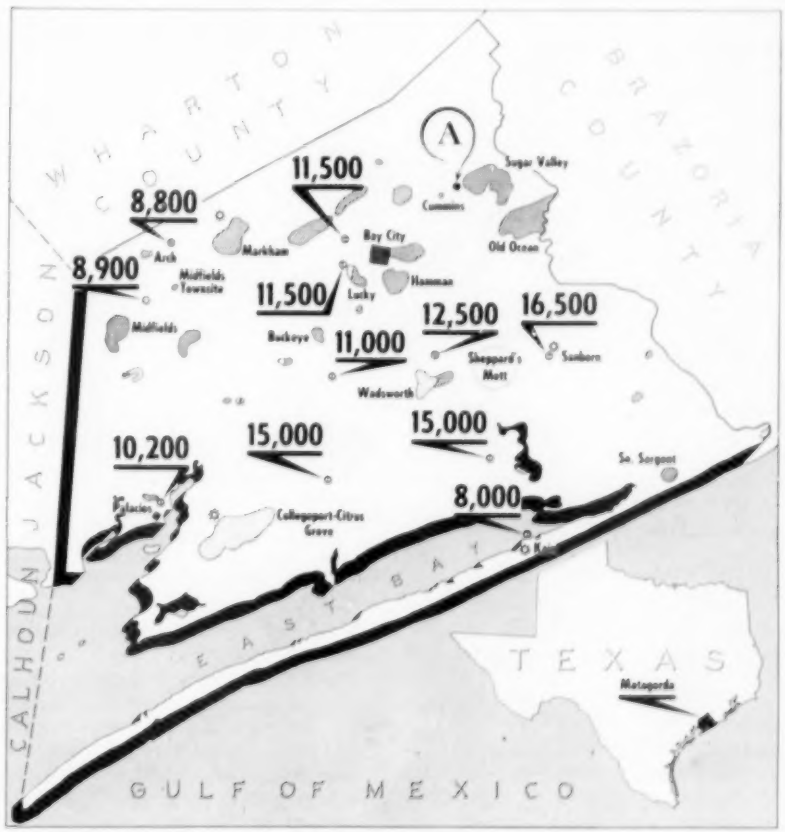
Current Gulf Coast exploration is significantly aimed at these 10,000-15,000-ft. sediments. Wildcats with 10,000-ft. objectives are no longer a novelty, but are commonplace. A glance at almost any drilling report reveals targets below 10,000 ft. and many below 15,000 ft. Drillers are cutting windows into buried Cenozoics that have never before been penetrated.

Matagorda laboratory . . . Typical of these Texas Gulf Coast drilling campaigns are those in progress in the coastal county of Matagorda. Here is a laboratory of discovery effort that tests the "10 to 15" province almost exclusively. Of 11 active wildcats in the county, 8 have objectives of 10,000 ft. or below; none is shallower than 8,000 ft.

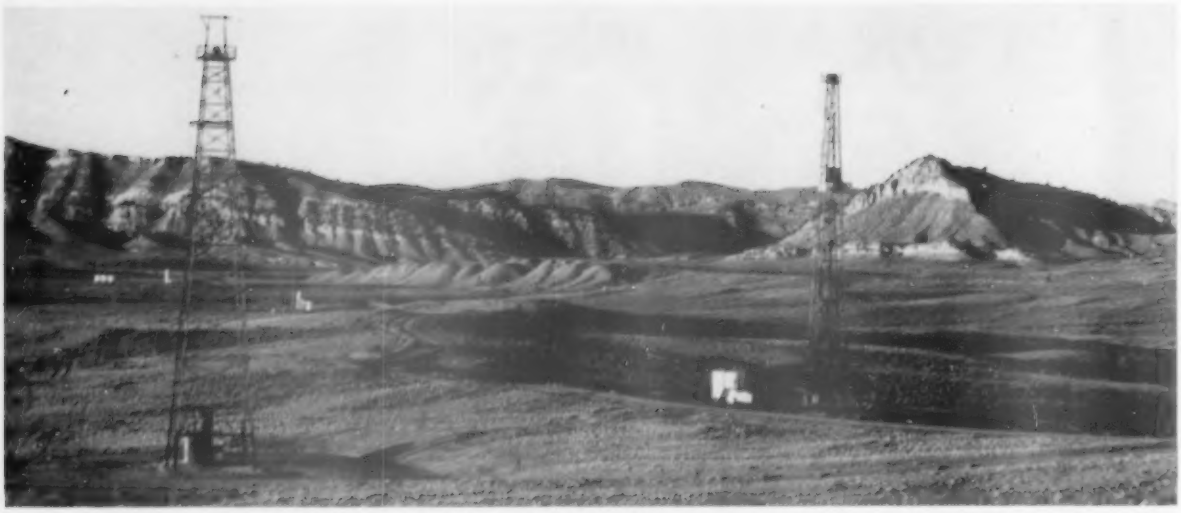
The results of the deep campaign exemplify also the pattern of Gulf Coast discovery today. At Sanborn, the deepest production on the coast was recently established from Frio sands at 13,048 ft. The Wadsworth area has yielded multiple sand reservoirs between 9,000 and 11,375 ft. Significant extensions are being made to the old Sugar Valley field (A on map) and to Old Ocean, still swelling westward from Brazoria County. One deep test after another is trying to solve the riddle of Sheppard's Mott, an old prospect located by the presence of a surface mound in 1917, but to date only a "teaser" to exploration men.

Future assured . . . The maximum thickness of all Cenozoic strata in this region is assumed to be about 30,000 ft. Whether the deepest of these will ever prove to contain economic oil reservoirs is a moot question; many geologists feel that they will not, and that the best bet for future large fields may lie in the Miocene sands near, at, or off the shore.

On the whole, such revisions and extensions add more to the nation's reserves every year than do new-field discoveries, and certainly the Texas Gulf Coast is the ideal hunting ground for such reserves. If Spindletop, after 52 years, can yield half a dozen new reservoirs per year, as it did in 1953, then there is impressive assurance that the same will be true of other and newer fields.



Of 11 active wildcats in Matagorda County, 8 are projected to depths below 10,000 ft.



Cretaceous sandstones form the prominent escarpment in the background that encircles the Grass Creek structure. Well on the left is an old Embar-Tensleep producer, while the rotary rig on the right is seeking Curtis sand production.

Curtis Sand Development Stimulates Drilling at Grass Creek, Wyoming

by Joseph A. Kornfeld*

UNTIL Curtis sand production was established at Grass Creek, this zone was not considered an important reservoir in the Big Horn basin of Wyoming. Now, however, oil companies are revising their thinking concerning the oil possibilities of the Upper Triassic Curtis sand. Many oil fields in the Big Horn basin have logged shows of oil in Upper Triassic sands, and these zones may produce over a wide area.

Curtis sand production at Grass Creek now covers a larger area than any other Grass Creek pay zone, with daily production of 7,000 bbl. from 150 wells. Frontier production runs about 800 bbl. per day, and the Embar-Tensleep about 6,000 bbl. per day.

Regional Geology

Grass Creek is a large surface structure on the southwest rim of the Big Horn basin and lies along the crest of a major line of folding. It is an excellent example of a surface basin, typical of many of the Rocky Mountain oil fields. The Cretaceous surface rocks on the flanks of the structure form prominent escarpments or rim rocks and almost completely surround the central basin.

Curtis sand production at Grass Creek of 7,000 bbl. per day has brought this zone into the limelight, and exploration geologists are changing their opinion of this zone that was formerly thought to be uneconomic.

Since Grass Creek is such a prominent surface structure, it was drilled early in Wyoming's oil history, and for many years ranked next to Salt Creek in the production of light oil. Frontier sands at 900 ft. were the first zone developed in the field, discovered in 1914 by W. L. Valentine. By September 1918, 332 wells had been completed and were producing from the Frontier sands.

Black asphaltic low-gravity crude was discovered in the Embar-Tensleep formations by Ohio Oil Co. in 1922.

Cumulative production from all zones in Grass Creek now exceeds 49,000,000 bbls. Today the major operators in the Grass Creek field are: Ohio Oil Co., Stanolind Oil & Gas Co., Fullerton Oil & Gas Co., British-American Oil Producing Co., Husky-Kinney Coastal Oil Co., Brinkerhoff Drilling Co., Pacific-Western Oil Co., and Gordon-Manning.

Drilling Practices

Several operators have been active in the development of the Curtis sand reservoir found at 3,300-3,800 ft. The usual practice is to drill the 15½-in. surface hole with cable tools to 100 ft. After 9⅝-in. surface casing is run, contractors move in rotary tools and drill to the top of the Curtis sand.

Crooked holes, although not a serious problem, do occur, especially above 1,500 ft. Crews normally carry two 6-in. drill collars down to 2,000 ft. and then add two more collars to the drilling string.

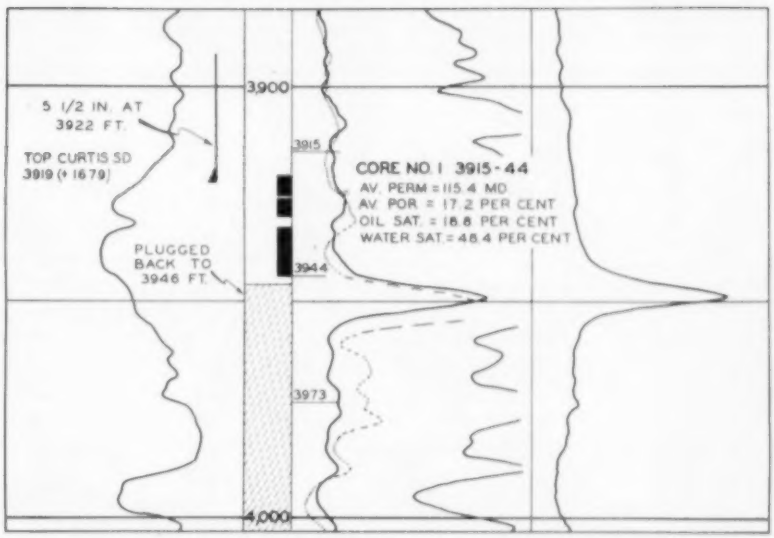
*The author is consulting geologist-engineer, Tulsa.

DRILLING TIME DISTRIBUTION

GRASS CREEK FIELD, HOT SPRINGS COUNTY, WYOMING

Exploration Drilling Co., Rig. 6
(Contract Depth 4,187 ft. 21 bits.)

Item	Hours	Per Cent of Total
On-bottom time	273.75	63.5
Tripping time	68.00	15.9
Running pipe and w.o.c. time on long string	18.00	4.2
Repairs to pumps	24.25	5.7
Fishing	3.00	0.7
Company time	1.00	0.3
Rigging up and tearing down	32.50	7.7
Miscellaneous	8.50	2.0
Total time, hours	429.00	100.00
Total time, days	17.87	
Total number of bits used	21	



Most wells are completed "barefoot" after fracturing. The sand-oil treatment increases initial production by 20 to 300 per cent.

Clear water is used in drilling to the Gypsum Springs formation where crews mud up; immediately above the Curtis sand, contractors convert to a bentonitic mud. Customary practice is to set the oil string on top of the pay, using either 5½ or 7-in. pipe, and complete the well "barefoot." Rotary tools are moved out after running the 5½-in., wells are drilled in and completed with cable tools. Severe winters in the Big Horn basin force contractors to enclose their rigs and heat them by steam.

Penetration rates in the field are generally low, about 8 to 15 ft. per hour. Crooked-hole tendencies prevail along the east side of the field and on the top of the Grass Creek structure. Oil companies require that hole deviation not exceed 5°. As a consequence, contractors run frequent straight-hole tests and immediately correct for any excessive deviation. Only two to six drill collars are used, and drillers must guard against sticking the pipe.

Differences in stratigraphy require various types of bits, and several days, drilling time may be lost through improper selection of bits.

Completion Practices

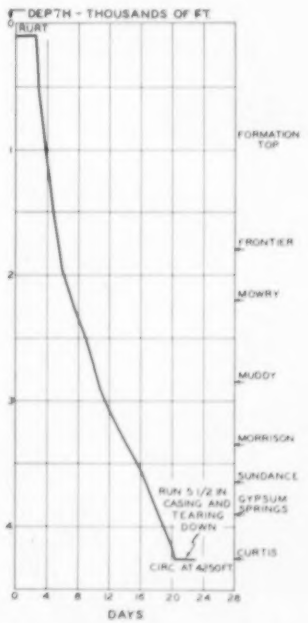
Some operators drill through the Curtis sand with rotary tools rather than set casing on top of the pay. The drilling mud is converted to an oil emulsion about 50 ft. above the Gypsum Springs. Occasionally the pay zone is cored if additional reservoir data are required. Even these operators set casing on top of the Curtis rather than through it.

Sand-oil treatment . . . All Curtis wells are fractured because initial production from the Curtis sand is usually less than 100 bbl. per day natural.

Usual treatment consists of 4,000 lb. of sand mixed in 100 bbl. heavy fuel oil. The formation is first broken down with crude oil and then the sand-oil mixture is squeezed into the formation. Maximum injection pressures range from 1,500 to 1,700 psi. during a sand-oil treatment. Fracturing increases the daily output of wells from 20 to 300 per cent. It is interesting to note that pressures up to 3,000 psi. have been required to break down the Curtis sand in the south end of the field.

Operators run 2-in. tubing, swab the well, and place on the pump.

Outlook . . . Many wells in the Big Horn basin have logged shows of oil in the Triassic sands, but as a rule these zones were never tested. Now, however, geologists can use the Curtis sand production at Grass Creek as a powerful argument for justifying drill-stem tests when similar shows are encountered.



Typical penetration curve in Grass Creek field. Cable tools are moved in to complete wells after oil string is set.

Contractors use a jackknife rig such as the one above in drilling to the Curtis sand. Crooked holes slow down operations especially on the east side of the field.

LOUISIANA

SOUTH LOUISIANA

Oil Discovery Hinted At St. Landry Test

A new oil discovery is in the making about 2 miles east of old Savoy field in St. Landry Parish.

It is the Fidelity Oil & Royalty Co. 1 Mrs. Linzay Brown. An unestimated amount of 38.7°-gravity oil flowed on initial test of perforations at 8,839-48 ft.

New oil pay . . . A new oil pay has been established by Sun Oil Co. at a re-worked discovery at Patterson in St. Mary Parish. The 1 Zenor, 42-15s-11e, was formerly a gas well. The well returned 130 bbl. of oil per day plus 50 per cent basic sediment and water on 9/64-in. choke from perforations at 12,039-045 ft.

Formerly the discovery flowed 18,000 M.c.f. of gas per day open flow from 11,385-392 ft.

Pine Bluff Field Gets Second Well

Pine Bluff field, Acadia Parish, has been confirmed with a second gas-distillate well.

Forest Oil Corp. 1 Pousson flowed an unestimated amount of gas-distillate from perforations at 11,801-11 ft. and 11,788-98 ft. The field was opened in 1953 by Sun Oil Co. 1 Acadia Parish School Board. It flowed 59 bbl. of distillate and 1,913 M.c.f. of gas per day on ⅛-in. choke from perforations at 11,532-552 ft.

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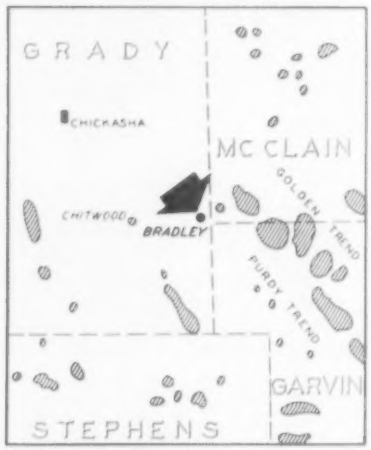
OKLAHOMA

More Pay Zones Found At Grady Costello Well

Gulf Oil Corp. et al 1 Costello, Grady County discovery of considerable importance, gaged 154 bbl. of oil in 90 minutes on a drill-stem test at 11,752-803 ft. in the second Bromide sand.

Gas was gaged at 9,240 M.c.f. per day. A previous test in the first Bromide sand flowed more than 100 bbl. of oil per hour on a drill-stem test at 11,714-49 ft. Oil flows were recorded on three tests of the first Bromide sand. The big strike is located in C NE SE 14-5n-5w. Gravity of the oil on the latest second Bromide test is 48°.



The general Bradley area of eastern Grady County, southwestern Oklahoma, is currently the hottest drilling area in the state. Deep Simpson group successes have established the deepest production in Oklahoma.

Bradley pool . . . Phillips Petroleum Co. 1 Steve, deep extension and new-pay discovery in Bradley pool, C SE NE 35-5n-5w, flowed 194.88 bbl. of oil in 7½ hours on a drill-stem test at 12,603-714 ft. in the first Bromide sand. The oil is 43.7°-gravity.

ARKANSAS

Rank Wildcat Planned South of Nashville

Eastern Howard County, southwestern Arkansas, is due for a remote 4,000-ft. wildcat test at Frank Ryburn and Associates' location 2 miles south of Nashville.

The well site is reportedly planned for the NE¼ 22-10s-27w. Work will begin about September 1. Granite is expected at about 3,500-4,000 ft. Magnetometer work will determine the location of the rank test. The site is believed to be on the north flank of a buried granite ridge.

New Gas Area Opened In Russelville Region

A new gas field has been opened in northwestern Arkansas' Russelville area.

Murphy Corp. 1 Barton, C NE 10-8n-19w, 8½ miles northwest of Russelville, found 3,000 M.c.f. of gas in the Atoka at 3,898 ft.

TEXAS

WEST TEXAS

First Dual Completion Made in Virey Field

Virey field in southwestern Midland County gained its first dual completion from the Pennsylvanian and Ellenburger pays. Cities Production Corp. and Forest Oil Corp. 1-L TXL extended Pennsylvanian production 1 location north and Ellenburger production ⅜-mile to the northwest.

Final potentials were calculated from 6-hour tests. From the Pennsylvanian at 10,333-10,358 ft., through 23/64-in. choke, it flowed 430 bbl. of oil a day, which rated 1,720 bbl. daily. Gravity was 52.7° and gas-oil ratio was 2,870 cu. ft. The flow was through casing, under pressure of 2,450 psi.

Location in SW SW 23-41-T3S-T&P adjoins the Dora Roberts Ranch acreage. It is the sixth Pennsylvanian well for the area and the third in the Ellenburger.

Devonian Prospect For Yoakum County

Another Devonian structure for northwestern Yoakum County was shaping up at Hunt Oil Co. 1 Johnson, Section 644, Block D, J. H. Gibson Survey. Field sources placed

tentative top on the Devonian at 11,435 ft., on elevation of 3,706 ft. On drill-stem test from 11,455-11,503 ft., tool open 2 hours, gas surfaced in 40 minutes and 37° oil flowed in 1 hour and 35 minutes. The well then flowed an estimated 15-20 bbl. an hour for the remainder of the test. Operators drilled 50 ft. for another test of the section.

Principal lease owners in the area are Hunt, Magnolia Petroleum Co. and Gulf Oil Corp. Nearest Devonian production is in Bronco field, about 8 miles to the northwest.

Phillips Petroleum Co. 1 TY "A" has extended Devonian production to the west in the Field pool in northwestern Yoakum County. When completed, it will be the fourth well in the pool.

Sample top on the Devonian was 12,043 ft., minus 8,177 ft., which was calculated 19 ft. low to the discovery well. A drill-stem test between 12,043-12,065 ft. had clean flowing oil in 33 minutes. When turned to tanks it gaged 124 bbl. of 46° oil in 1 hour, with gas volume at 1,052,000 cu. ft.

Howard County . . . Texas Pacific Coal & Oil Co. 1 Hyden has given the Luther Siluro-Devonian field a 1-mile north extension, giving the area an expected 4-mile northsouth producing sector. After acid treatment the well flowed 99 bbl. of new oil in 10 hours through 24/64-in. choke, from perforations at 9,909-15 ft. Location is in SW SW 47-32-T3N-T&P Survey, 17 miles north of Big Spring.

TEXAS GULF COAST

Gas-Distillate Strike For Galveston County

Superior Oil Co. has a new gas-distillate producer 1 mile northeast of Algoa at 1 Cooper Unit, Galveston County.

The well tested at the rate of 436 bbl. of 41.4°-gravity distillate through 20/64-in. choke from Frio perforations at 11,686-694 ft. No gage was taken on the gas. When on 18/64-in. choke the strike flowed at the rate of 5,750 M.c.f. and 324.5 bbl. of 42.2°-gravity distillate per day.

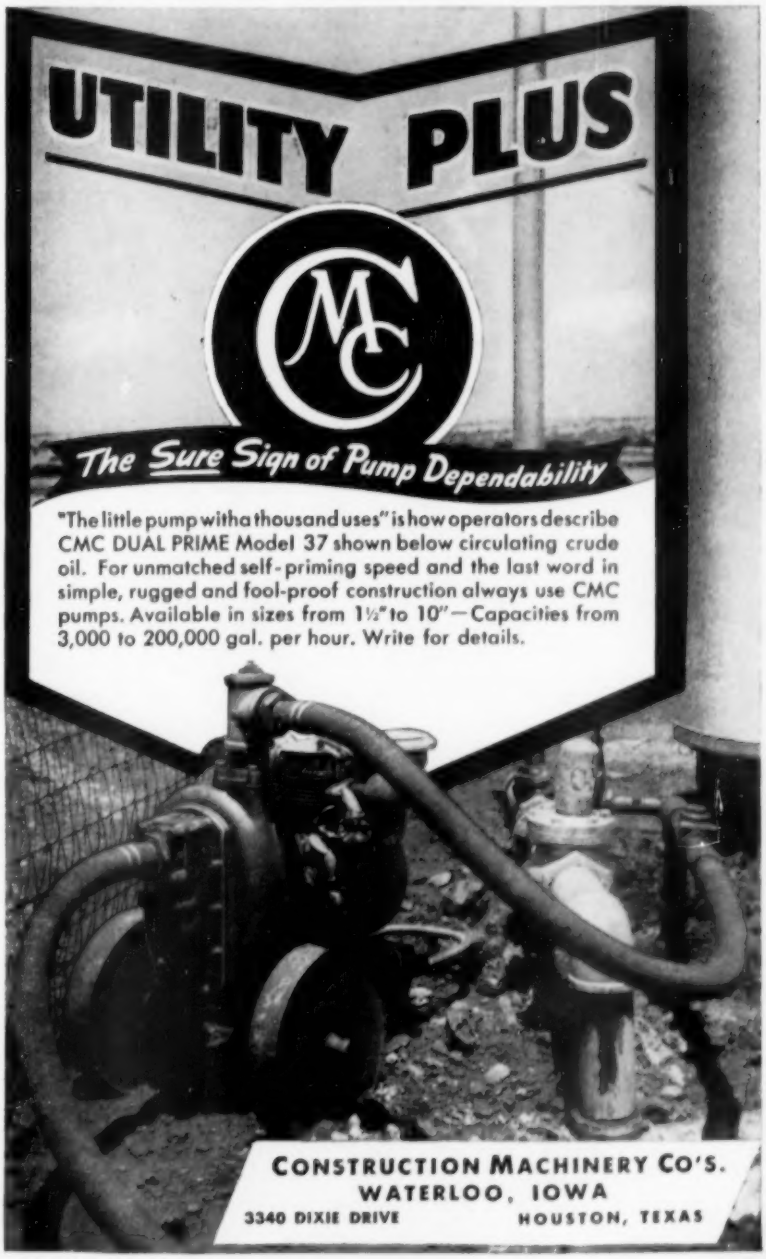
The 11,975-ft. discovery is in the I&GN Survey 13, A-601, about 1¼ miles east of the abandoned old Algoa area.

Gage Taken at Alvin Area Gas Strike in Brazoria

An open flow of 15,000 M.c.f. of gas per day from the lower Frio through perforations at 10,153-158 ft. has been run by Dillard & Waltermire and Alfred C. Glassell, Jr. at 1 Oliver, 2½ miles southeast of Alvin, Brazoria County.

Nearest like production is at Chocolate Bayou field, 3 miles to the south.

Conroe townsite . . . A new gas-distillate pay has been found at Humble Oil & Refining Co.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1 Federal Royalty Co. et al, Conroe Townsite field, Montgomery County.

An open flow of 7,400 M.c.f. of gas per day with a distillate spray was reported on completion from Cockfield perforations at 6,232-41 ft. The well is in the John Bricker Survey, A-71, 2.6 miles southwest of the town of Conroe. The well was formerly an oil well at 6,312-16 ft. It flowed 25 bbl. of 36.1°-gravity oil per day.

SOUTHWEST TEXAS

New Pay Discovery In La Sara Field, Willacy

Willacy County's new LaSara field has a new oil pay at the field's second well. It is Superior Oil Co. 2 Yturria Cattle Co.

The new oil pay flowed at the rate of 93.6 bbl. of 36°-gravity oil per day through 7/64-in. choke on a 3-hour test from perforations at 6,411-21 ft.

Superior Oil Co. opened LaSara field at 1 Yturria earlier this summer. It was finaled flowing 120 bbl. of oil per day from perforations at 6,028-34 ft. on 17/128-in. choke. The field is about 6 miles northwest of the town of Raymondville.

NORTH TEXAS

Wise County Discovery Completed In Stream

Tom B. Medders 1 W. T. Blocker, 3 miles east of Park Springs, has been completed as a flowing discovery from middle Strawn pay between 4,667-4,743 ft. Daily potential was 455 bbl. of 42° oil through 24/64-in. choke. Tubing pressure was 75 psi. and gas-oil ratio was 300 cu. ft. Nearest production is Hodge upper conglomerate field, 3 miles to the south.

Byrd Oil Corp. 1 Pearson, gas-distillate prospect 2 miles south of Cottondale, was flowing an estimated 5,000,000 cu. ft. daily following acid and fracture treatment between 5,200-08 ft. The flow was through 14/64-in. choke. The amount of distillate was not reported. Previous tests have indicated gas pay at 5,770-5,840 and 5,858-5,605 ft.

EAST TEXAS

New Gas Pool Has Flowing Oil Well

Midstates Oil Corp. 1 Taylor, located 2 miles northwest of the gas discovery of Locust Grove field in eastern Harrison County, flowed 166 bbl. of 35° oil a day through 14/64-in. choke. Pay section was the Pettit limestone at 6,222-27 ft. Gas-oil ratio was 450 cu. ft.

Midstates was also clearing location for a second test in the area, to be the 1 Hagerth. Location is approximately 1 mile east of the 1 Taylor gas discovery, and projected depth of 6,600 ft. is expected to test the Travis Peak.

Smith County . . . Sinclair Oil & Gas Co. 1 Thompson, wildcat in J. M. Procella Survey, A-43, east of the town of Troup and 2½ miles west of Woodbine production in East Texas field, had prospects of oil from the Travis Peak.

On drill-stem test from 8,352-8,410 ft., recovery was water cushion and 180 ft. of oil and gas-cut mud. Time was 1 hour. Bottom-hole flowing pressure ranged around 500 psi. Operators ran 7-in. casing to 1,480 ft. for production tests.

SOUTHWEST TEXAS

Big Kenedy County Gas Strike Is Completed

Continental Oil Co. 1 State Tract 393 in Laguna Madre, 14 miles north of Port Mansfield in Kenedy County, has been completed for a flow of 20,000 M.c.f. of gas per day.

The well is shut-in after gaging 2,500 M.c.f. of gas plus 25 bbl. of distillate per day on 12/64-in. choke from Frio perforations at 9,404-34 ft. The new pool is 17 miles southeast of Potrero Lopeno field.

New oil pay . . . Scott & Hopper field in Brooks County has a new oil pay discovery at Hawn Bros. 3 Mestena Oil & Gas Co. The new-pay strike flowed 88 bbl. of 42°-gravity oil per day through 7/64-in. choke from perforations at 6,588-96 ft.

ILLINOIS

Illinois Oil Acreage Extended

Oil operators extended productive acreage in four Illinois oil pools during July. Five new pays were discovered in four fields and three pools were consolidated into one.

Illinois operators produced oil in July at the rate of 2 bbl. a second, or 128 bbl. a minute, to make a daily average of 184,000 bbl. This was a slight drop from the high of 187,000 bbl. in June as production returned to the May level.

Oil pools extended by successful wildcat wells were Dudleyville East (Bond County), Sailor Springs Consolidated (Clay County), Main (Crawford County), and Roland Consolidated (Gallatin County).

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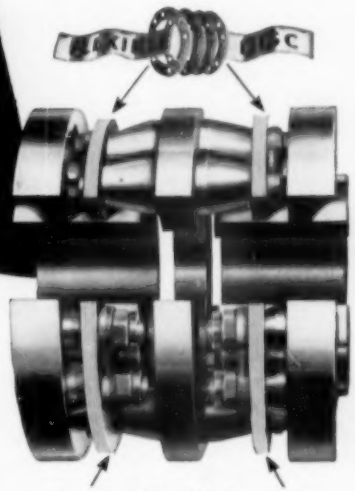

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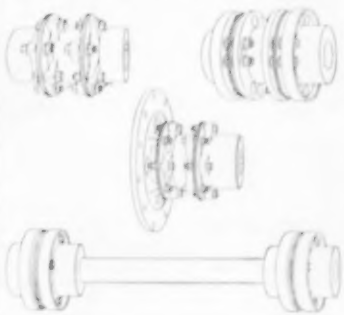

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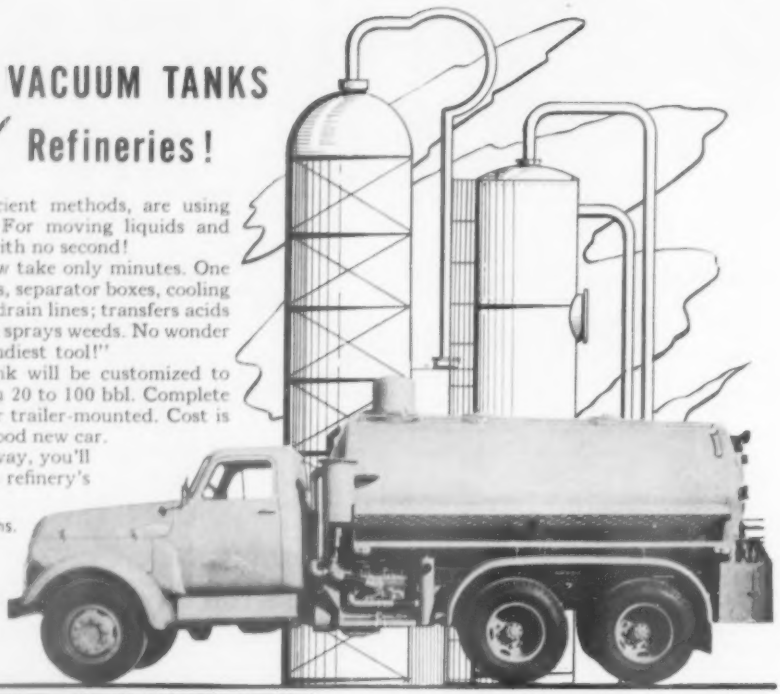

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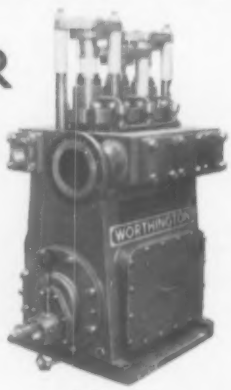

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Christian and Macon counties have also extended productive acreage in the Mt. Auburn area. As a result, Mt. Auburn, Mt. Auburn Central, and Mt. Auburn East pools are now grouped into Mt. Auburn Consolidated pool.

New pays, all in limestone, are: McClosky in Norris City pool (White County); Rosiclare in Hill East (Effingham County) and Eldorado East (Saline County); Rosiclare and Lower Ohara in Iuka (Marion County).

Drilling activity, always high in the summer, is running well ahead of last year's activity. Operators completed 331 wells in the five-week period covered by the July report, or an average of about 66 wells a week.

Of the 331 wells drilled 181 were producing wells and 78 were dry holes completed in pool areas. All of the 34 wildcat wells drilled more than 2 miles from production were dry. Four of the 39 wildcat wells drilled ½ a mile to 2 miles from production extended pool acreage; the other 35 were dry holes. Wells worked over included 11 former dry holes which were transformed into producing wells.

Preliminary reports on recent drilling in a small area in southern Crawford County indicate initial productions ranging up to 3,000 bbl. flowing. The pay is the Cypress sandstone, and the area is surrounded by older fields which produce from shallow Pennsylvanian sandstone.

CALIFORNIA

New Fillmore Wildcat

Standard Oil Co. of California was preparing location for a wildcat, 1 Hardison Ranch-2, about 1 mile northeast of its recent discovery on the Sespe Ranch near Fillmore, Ventura County. Location of the new test is in 27-4n-20w. The discovery, 1 Sespe Ranch, was completed last April from the interval 14,170-14,235 ft., flowing 671 bbl. of 27°-gravity crude and 457 M.c.f. of gas through a 21/64-in. choke. A southern offset, 2 Sespe Ranch in Section 34, has reached a depth below 13,000 ft.

Beverly Test Completing

Universal Consolidated Oil Co. was in process of completing its second test from the Twentieth Century-Fox Studio drill site at Beverly Hills. The well was bottomed at 7,417 ft. after topping the Miocene oil sand at about 7,000 ft. Earlier it had encountered a new gas sand at 4,800 ft. The discovery well, 1 20th Century-Fox, has been shut in since its completion several months ago, pending installation of a pipeline outlet.

KANSAS

Pump Going Up at New Pratt Oil Discovery

Pump is being installed at a new Pratt County oil discovery, Sterling Drilling Co.-Carl Hertlein 1 Elliott.

The Simpson discovery is in NE SW SE 31-27s-13w, about 1½ miles from nearest production at Fitzsimmons pool in central Pratt. Perforations are at 4,427-31 and 4,435-44 ft. The flow came after fracturing. The Viola further up also indicated production.

KENTUCKY

New State Map

The Kentucky Geological Survey announces the release of an interim state geologic map, printed in cooperation with the Agricultural and Industrial Development Board of Kentucky.

Size of the geologic map of Kentucky is 27¼ by 14 in.; scale: 1:1,000,000; four colors; three structure sections. This map may be purchased from the Kentucky Geological Survey, 307 Mineral Industries Bldg., 120 Graham Avenue, Lexington, Ky.

The map is adopted with minor revisions from geologic maps of Kentucky dated 1927 and 1929 by W. R. Jillson.

HUGOTON EMBAYMENT

Hansford Atoka Discovery Reports Final Gage

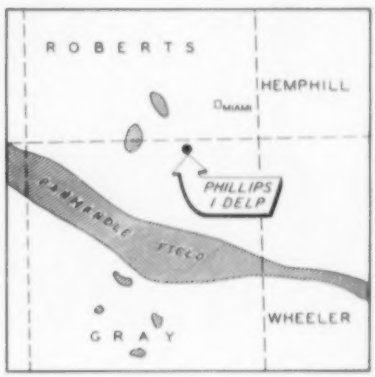
Northeastern Hansford County, Texas Panhandle, has a completed Atoka discovery at Colorado Oil & Gas Co. and R. H. Fulton 1 Steele, Section 49, Block 45, H&TC Survey.

The wildcat flowed 4,800 M.c.f. of gas per day from perforations in the Atoka at 5,256-68 ft. on final gage. It is 12 miles north of Spearman and 6 miles southeast of Hitchland-Pennsylvanian field.

Toklan Production Co. is deepening at 1 Collard-Steele to the south of the 1 Steele 4½ miles. A test showed a possible link-up between the 1 Steele and the Fulton 1 Matthews, recent Morrow gas discovery. The test was made in the Tonkawa, topped at 5,346 ft. The wildcat is in Section 75, Block 45, H&TC Survey, 9 miles north of the town of Spearman and 5 miles northeast of the 1 Matthews Morrow discovery well in Hansford County.

Gray County Has Second Deep Discovery Hinted

Another Pennsylvania gas-distillate discovery is in the making for north-central Gray County, Texas Panhandle (arrow on map).



It is the Phillips Petroleum Co. 1 Delph, Section 110, Block M-2, BS&F Survey, 7 miles southwest of Miami. A 1½-hour drill-stem test of the Pennsylvanian granite wash at 4,904-34 ft. surfaced gas in 8 minutes at 7,932 M.c.f. per day. Recovery was 5 ft. of distillate and 1,975 ft. of gas and distillate-cut salt water.

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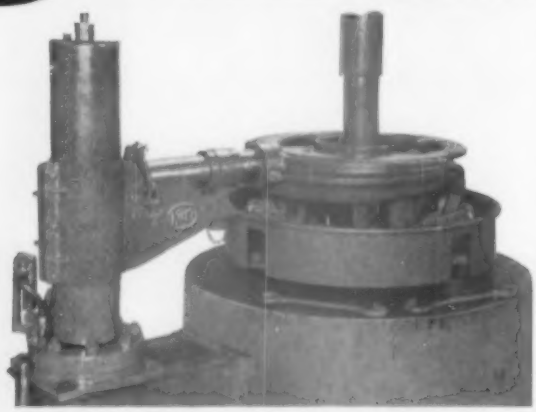

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APPALACHIAN AREA

WEST VIRGINIA

Blue Sulphur district, Greenbrier County, West Virginia Columbian Carbon Co. 1193 W. E. Hedrick, wildcat is drilling at 4,256 ft. Gore district, Hampshire County, M. E. Anderson 1 E. W. Dolan heirs is at 1,261 ft. Walker district, Wood County, Hope Natural Gas Co. 9634 Power Oil Co., is shut down at 5,450 ft., for core drilling.

In Circleville district, Pendleton County, West Virginia, Columbian Carbon Co., started operations at 2-1203 United States of America, Tract 746 rank wildcat, elevation 3,911 ft. Spruce Knob Quadrangle, 1.49 miles south of latitude 38 degrees 40 minutes and 2.28 miles west of longitude 79 degrees 35 minutes. Dry Fork district, Randolph County, this company ran the 10-in. casing at 812 ft., in 1-1202 on other lands of the United States of America. Glade district, Webster County, Nelson W. Taylor, Agent 1 A. C. & Olive Thomas, elevation 2,303 ft., gaged 696,000 cu. ft., of gas after sandfrac, Maxon sand, 1,478-1,541 ft., gas 1,495-1,505 ft., TD 1,541 ft. Gregory Gas Co. 1 H. F. Howard, elevation 2,250 ft., resulted in a dry hole in this formation. TD 1,516 ft.

PENNSYLVANIA

In Derry Township, Westmoreland County, Southwest Pennsylvania, Mid East Oil Co. 1 Frank Litvik, wildcat was dry, Tully 7,180 ft., Onondaga 7,755 ft., chert 7,765 ft., Oriskany sand 7,893 ft., Helderberg 7,915 ft. TD 7,977 ft. Monroe Township, Bedford County, John Galey 1 Donald Miller, is drilling at 4,884 ft. Connellsville Township, Fayette County, Peoples Natural Gas Co. 4030 F. K. Buttermore heirs, completed rigging up the rotary outfit and drilling is at 6,310 ft. Pine Township, Indiana County, Fryer & Hanson first reporting 1 E. W. Smith, have made a correction in name to 1 Lucinda Mitchell, elevation 1,670 ft., Barnesboro Quadrangle, 5.5 miles south of latitude 40 degrees 40 minutes and 3.0 miles west of longitude 78 degrees 55 minutes, drilling at 2,460 ft.

Pine Township, Indiana County, Southwest Pennsylvania, Fryer & Hanson are moving in at 1 E. W. Smith, wildcat. This well is on the Barnesboro Quadrangle. Cherry Hill Township, Chestnut Ridge Oil & Gas Co. 3 Ralph White, is drilling at 7,580 ft., and in Grant Township, Fairman Drilling Co. 1 Herb Gernandt, is at 3,800 ft. Parker Township, Butler County, Walker et al 1 John Walker, is drilling at 3,244 ft. Salt Lick Township, Fayette County, Mid Atlantic Oil & Gas Co. 1 Adolph Dupre, is drilling at 4,205 ft. Gaskill Township, Jefferson County, Fairman Drilling Co. 1 Clair Reed, reached 4,400 ft.

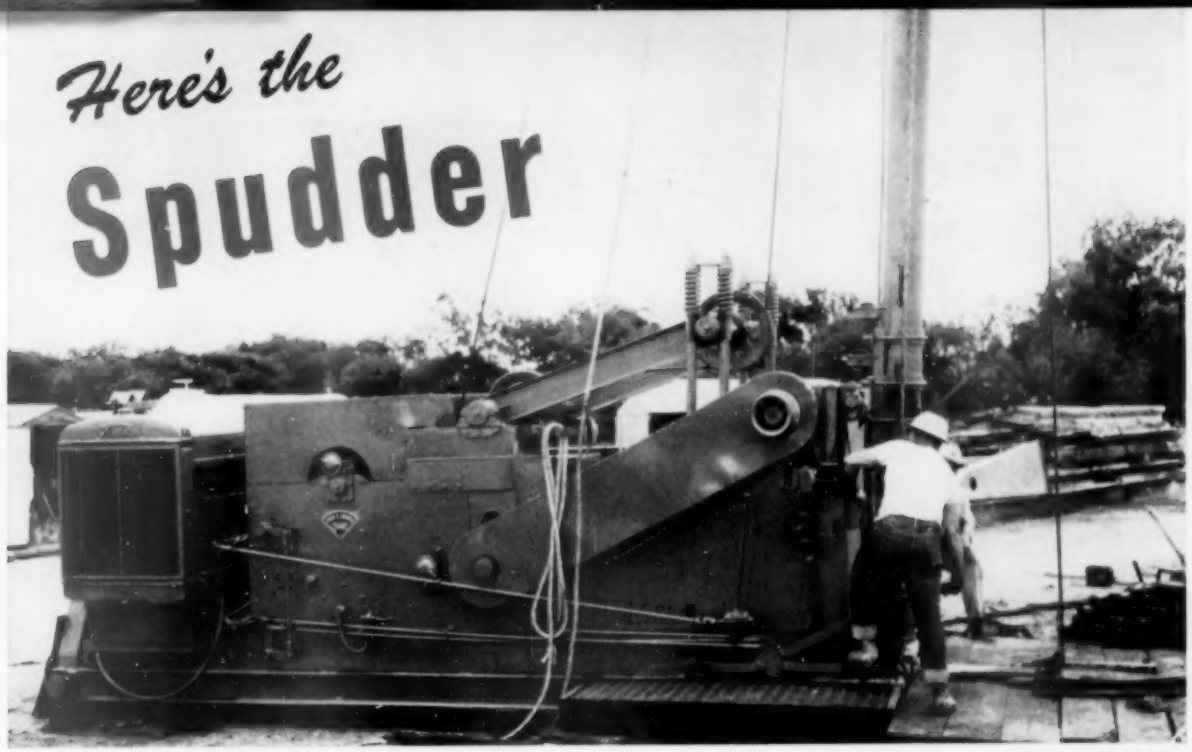
OHIO

Ohio Fuel Co. succeeded in plugging off the water in their ½-mile extension to North Royalton pool. The 1 John Heege, Section 14, Royalton Township, Cuyahoga County, topped the Oriskany sand at 1,769 ft. and drilled to 1,830 ft. with an open flow of 1,330,000 cu. ft. natural.

Frank Lyons et al 3 John Donaker, Section 23, Perry Township, Coshocton County, ¼ mile east of the 2 Donaker, which had an oil and gas showing, gaged 1,000,000 cu. ft. natural in the Clinton, found at 3,043-3,181 ft.

Grim Bros. 1 Margaret Grim, Fr. 32, Lodi Township, Athens County, intended for the second Berea sand, found 800,000 cu. ft. in the first Berea, topped at 1,554 ft., and drilled in to 1,558 ft.

Here's the Spudder



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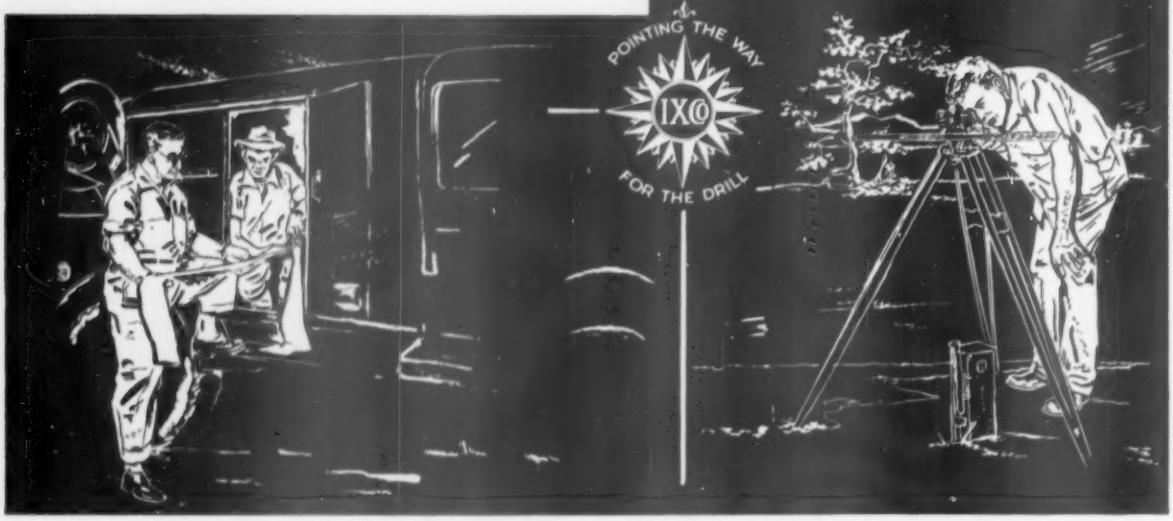

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CANADA

Granite Wash Show Reported At Iosegun River Wildcat

A showing of oil, which would appear to be noncommercial, has been recovered from the granite wash formation at Canadian Gulf Oil Co.'s exploratory well in the Iosegun River area of northwest Alberta, south and east of the south Sturgeon Lake D3 oil wells and about 95 miles south of Peace River town.

The well is Gulf 15-28 Iosegun, around 7 miles southeast of the H.B.-Union 15-31 Liberal D3 oil well and 5 miles east of Gulf-Little Smoky D3 oil production. Crew entered the granite wash at around 9,804 ft., or 7,486 ft. subsea (K.B. elevation 2,318 ft.), and drill-stem tested the interval 9,807 ft. to 9,832 ft. Valve was open 45 minutes and shut in 15 minutes. There was a good initial puff, followed by a steady air blow throughout test. When pipe was pulled it was found to contain 6,006 ft. of fluid, comprised of 2,366 ft. of water cushion 2,093 ft. of oil and gas emulsion, 637 ft. of oil and gas-cut salt water, and 910 ft. of salt water. Gravity of the oil is 40.8°.

Crew has run logs and, although the strike does not appear to be commercial and casing will not be run, crew plans to core an additional 5 to 10 ft. for geological information, prior to completing the well.

Wapella . . . The Sohio Petroleum Co. group has discovered medium-gravity oil at its exploratory venture located 3¼ miles northeast of oil production in the Wapella area of southeast Saskatchewan, 90 miles northeast of Weyburn and 110 miles east-southeast of Regina. The find was made in the Jurassic formation, one of the productive horizons in the main Wapella oil pool.

After drill-stem testing in the Jurassic, between 2-236 and 2,574 ft., and recovering only sulfur water with no evidence of oil, and log was run and it was determined that oil would likely be obtained higher in the formation, so production string of casing was set and hole was perforated opposite the indicated production zone.

The well, Sohio 13-31 North Wapella, is about 2 miles west of Wapella railpoint. Hole was taken down to total depth 2,870 ft., and string of 5½-in. casing was set. Crew perforated the intervals 2,221-24 ft. and 2,225-31 ft., with four shots per foot. Pump unit was installed and oil and a slight amount of water was produced, with fluid rate being about 60 bbl. daily, mainly 28°-gravity. Production tests will be continued.

Tilley area . . . Key Oil & Gas, Ltd., and Tartan Petroleums, Ltd., Calgary independents, have discovered a moderate flow of natural gas in the Bow Island sand at their exploratory driller in the Tilley area of southeast Alberta, 50 miles northwest of Medicine Hat and 70 miles northeast of Lethbridge.

The Bow Island gas came at Key-Tartan 1 Tilley, which is 3½ miles south-southwest of the Cal-Standard 11-2-18-13 Bantry wildcat that discovered light gravity crude oil, and 12 miles southeast of Brooks. A 1-hour drill-stem test was run from 2,470 to 2,500 ft. and natural gas flowed at maximum rate 550,000 cu. ft. daily. Pipe recovery was 1 bbl. of water, believed to be from the drilling fluid. Crew is now drilling ahead, in search of objectives in the basal Colorado, Sunburst and basal Blairmore horizons.

Roanmine area . . . Socony-Vacuum Oil Co. of Canada, Ltd., has encountered a showing

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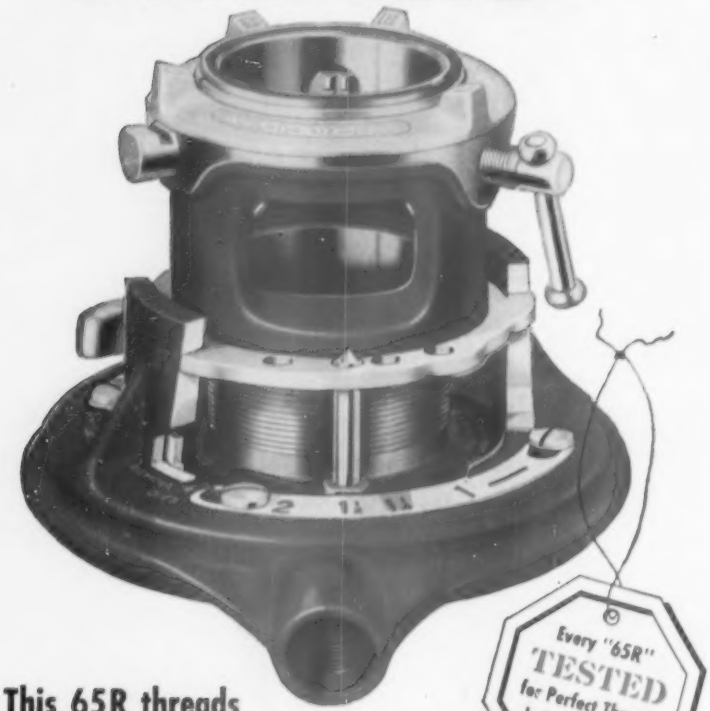

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of oil and gas-cut mud in the Mission Canyon section of the Mississippian at a wildcat in the Roanmine area of south central Saskatchewan, has set casing, perforated and is running swab tests. This venture, on farmout lands from the Sohio Petroleum Co. group, lies about 50 miles southwest of Weyburn and 75 miles due south of Regina.

The well, Socony-Sohio 20-6 Roanmine, is 11 miles southeast of the Socony-Sohio 1 Ritchie abandonment, and about that same distance southwest of Shell 1 Ceylon dry hole.

Only reported Mission Canyon drill-stem test was run from 5,936-61 ft. for 4 hours. Recovery was 40 ft. of slightly oil and gas-cut mud. There was no evidence of water. Hole was taken down to 6,790 ft., and following running of logs, it was felt that the well warranted the setting of string of production casing for further testing operations Hole was plugged back and 7-in. casing was set at 5,932 ft.

The Mission Canyon was perforated from 5,936 to 5,960 ft., with 48 jet shots, and at latest report crew was swabbing the well. As yet no swab recoveries have been reported. Whether or not the well will yield commercial production, or whether only geological information will be obtained should be determined following completion of the testing period.

North Carbon . . . Socony-Vacuum Oil Co., of Canada, Ltd., has found a small gas blow during drill-stem test in the Viking sand at its North Carbon area wildcat in southern Alberta, about 48 miles northeast of Calgary.

The well, Socony 26-14 North Carbon, is 13 miles east of the Delhi-Banff D3 Acem oil discovery well. A 1 hour drill-stem test in the interval 4,440-4,500 ft., flowed gas in 30 minutes, at rate 44,000 cu. ft. daily. Recovery was 40 ft. of gas-cut mud. Well is now drilling below 4,770 ft.

Ghost Pine . . . Shell Oil Co. has obtained a slight gas blow in the Viking sand at its driller in the Ghost Pine area of southern Alberta. The showing, although encouraging, is deemed noncommercial.

This venture, Shell-Fleetwood-Emjay 3-1 Ghost Pine, is being drilled by Shell on farmout lands from Fleetwood Petroleums, Ltd., and Canadian Emjay Petroleums, Ltd. Wellsite is about 57 miles northeast of Calgary and 1½ miles southeast of the South Brazeau-Fleetwood 1 Emjay Madison oil discovery well.

A drill-stem test was run in the interval 4,128 to 4,165 ft. and gas reached the surface in 12 minutes. Gas flow was too small to measure. Recovery was about 25 ft. of gas-cut mud. Drilling is now proceding below 4,320 ft.

EASTERN CANADA

Ontario . . . Imperial Oil has started the first of two tests to be drilled this season near Ferndale, in the Bruce Peninsula. The company in the past few years has secured extensive acreage in the previously untested area. The Bruce Peninsula, between Lake Huron and Georgian Bay, lies between the Hepworth area in Bruce, where gas has been encountered in the Trenton limestone around 1,425 ft., and Manitoulin Island to the northwest, where oil shows have been encountered at shallower depth in the same foramtion.

In the Wardsville area, on the Elgin-Middlesex County boundary, Anchor Petroleum and Western Ashley Minerals have completed a joint test for gas. Anchor-Ashley 4 was finished at 1,541 ft. depth with 42 ft. of pay and rated an open flow of 166,000

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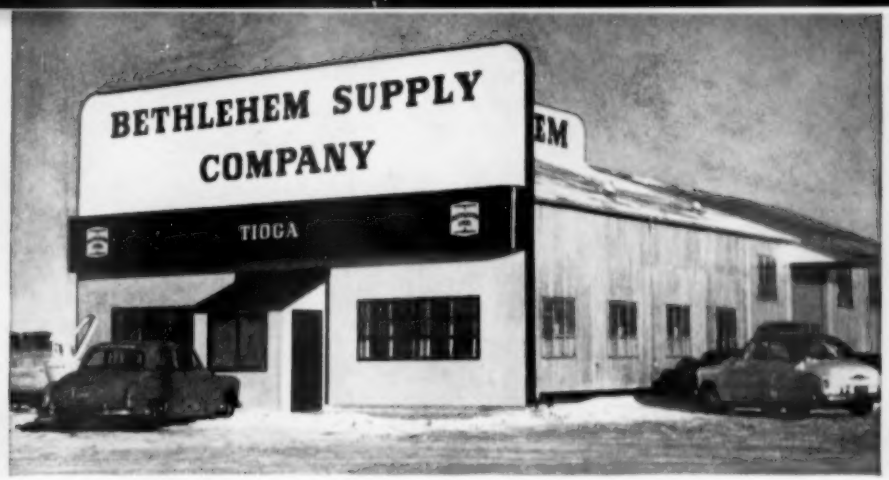

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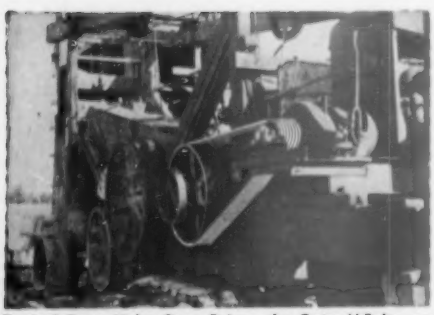

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cu. ft. daily. Anchor-Ashley 5 is drilling. Aggregate open flow of the four Anchor-Ashley producers is rated at 867,000 cu. ft.

Petrolia . . . Work is continuing in the old Petrolia field, Lambton County, where Eastern Royalties, Inc., of Bradford, Pa., is in the early stages of a water-injection program, designed to recover additional oil from the depleted shallow wells. Operations are in progress on the Telsey property, just north of the S. Nord Chemical Co. plant. Arrangements for the program were made by two officials of the firm, R. J. Brennan and J. C. Artley, with Sydney Earle of Kerwood handling the drilling. William Baines of Petrolia is manager of the field. Comprising 265 acres, the field once had 365 producing wells, but lately the number has declined to 26 with pumping production aggregating around 3,500 bbl. a year.

ROCKY MOUNTAIN

COLORADO

"D" Sand Gas Recovered in Eastern Washington County

J. M. Thomson, Denver, has reported recovery of gas at the rate of 2,500 M.c.f. per day on test of a wildcat in eastern Washington County. The well is about 26 miles east of previous production in the central Denver-Julesburg basin. The wildcat is 1 Heiserman, SE SE SW 25-3n-50w. Test was of the zone 3,958-93 ft. There was gas at the surface after 7 minutes. Recovery in pipe was 5 ft. of gas-cut mud. The operator reported flowing pressure of 230-410 psi.

The well offers significant encouragement to exploration on the east side of the Denver-Julesburg where it has previously been well scattered and somewhat sporadic.

Oil Discovery in Moffat County Completed

The Texas Co. has completed 1 Treleaven, NE SW SW 32-5n-95w, Moffat County for a pump gage of 323 bbl. of oil per day. Production is from Morrison, topped at 6,296 ft. The well is northwest of the Maudlin Gulch Unit, where Texas Co. is operator, and is also north of a 1953 discovery just outside the unit which found Morrison production.

Pennsylvanian shows have been recovered at a rank wildcat in Las Animas County in the Raton basin. The important test is Bruce Sullivan Drilling Co. 1 Dutto, NW NW NE 27-33s-62w, 10 miles east of Trinidad. The shows were tested in the upper Madero section. Nearest Pennsylvanian production is more than 100 miles to the northwest.

Mesaverde Gas Discovery Reported Complete

Quintana Production Co. has reported a flow of 1,500 M.c.f. of gas per day from 1 C. F. & I. Corp., NE SE SW 13-12n-89w in the Slater Dome area, Moffat County. Test was through ¼-in. choke and flowing pressure is 640 psi. Full data has not been released. Drill-stem tests made as much as 4,000-5,000 M.c.f. per day. Production is from Mesaverde at 2,534-42 ft.

NORTH DAKOTA

Test Attempt Fails At Rough Creek Wildcat

Attempted drill-stem test of The California Co.'s 1 Unit, NW NE 13-148n-96w, McKenzie County failed when casing collapsed. The operator reported tool open for 2½ hours in the zone 11,789-11,840 ft. The well is plugged back to 9,930 ft. and tests will continue in upper horizons where some shows were logged during drilling.

MONTANA

Glacier County Discovery Flows Oil

Union Oil Co. and Carter Oil Co. reported recovery of 516 bbl. of oil in 20-hour test of 1 Miller-Tribal, C NW NE 7-33n-6w, apparent lower Mississippian discovery in the Cadmus area of Glacier County. The

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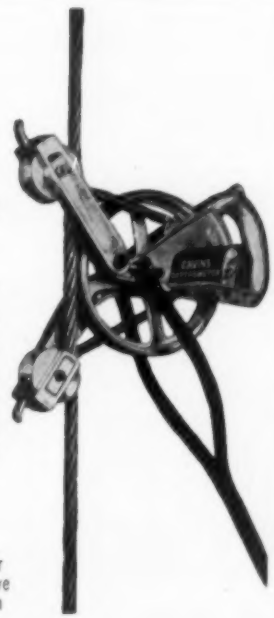

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well flowed for 12 hours, then flowed by heads and was dead at the end of 20 hours. Test followed acidization with a total of 10,000 gal. The operators are moving in swabbing equipment for further testing.

The recovery is the best reported to date from either of the two apparent discoveries in this county. These operators are testing at 1 Tribal-544, C NW NW 19-37n-8w, in the Landslide Butte area, and have two other wildcats in the county which are nearing decisive depth.

Fallon County Wildcat Recovers Mississippian Oil

Shell Oil Co. recovered 1,720 ft. of oil on test of Mission Canyon at 14-34 Unit, C SW SW 34-5n-61e, Fallon County. The well is 2 miles northwest of production in Little Beaver field. Test was open for 2½ hours in the zone 6,828-58 ft. Recovery also included 460 ft. of oil-mud emulsion.

Completions in other fields along the Cedar Creek anticline with the exception of those in the general Richey area have been in Silurian or Ordovician. Good recoveries of oil were reported by Shell on tests in Cabin Creek unit wells, no well in that field has been completed in Madison to date.

Shell is drilling below 6,858 ft. at the apparent discovery.

WYOMING

New Carbon County Production Indicated

McElroy Ranch Co., Natural Gas & Oil Co., and Bruce Anderson recovered gas at the rate of 4,000 M.c.f. per day on test of Sundance at 3 Horne, NW NE SW 11-20n-79w, Carbon County. Test was of the zone 5,826-40 ft., in Sundance. The well is a twin to an earlier well in this field which became a Muddy oil discovery and was not drilled to the original Sundance objective. It was completed for a flow of 50 bbl. of oil per hour. The operators are reported reaming and will make further tests at the 3 Horne.

Wide Spacing for Part Of Clareton Trend

Operators in part of the Clareton trend through Weston and Niobrara counties have applied for approval of a 160-acre spacing pattern. About 20 operators in areas on the southern portion of the trend are involved. Parts of the Cheyenne River, Sherwin, Wagonhammer, Snyder Creek, Dogie Creek and some adjacent areas are affected. Hearing on the proposal will be held in Cheyenne on August 26.

Drilling in the area affected has been on a 160-acre pattern, but only a few wells have been drilled. In other areas of the trend 40-acre spacing is prevalent. A total of nearly 61,000 acres is covered by the proposal.

WESTERN NEBRASKA

Apparent Kimball Discovery Finds More Oil

Williamson, Nixon and United Drilling recovered 1,800 ft. of oil on test of 1 Swearingen, SE SE NE 15-14n-55w, Kimball County. Test was in the zone 6,275-6,303 ft. in "J" sand. A previous test at 6,275-87 ft. made 270 ft. of oil. The operators are drilling below 6,303 ft. at the apparent discovery.

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to keep them makin' hole—
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One night his big chance came
just as he was quittin' work
A Judson county rig was lame
the engine wouldn't perk.

You can count on me, said Elmer,
to deliver the parts, I'm proud
to serve United's customer—

I'LL BRAVE YON THUNDER CLOUD!"

They loaded the parts in nothin' flat
and Elmer began to roll—
on safety he always stood pat
as he sped toward his goal.

It was a night that really wasn't fit
for man or even beast—
and when the big storm really hit
Elmer just kept headin' East.

He knew United's slogan well
"You can rely on United Supply"
to look at his face you could tell
that to him it was do or die.

Suddenly his truck took off the ground
up into a funnel-shaped cloud.
The roar of the wind made a terrible sound
and Elmer sang out loud.

"Off we go into the wild blue yonder"
His voice rang clear and true
But his mind would never wander
from the job he had to do.

Now his truck began to descend
and Elmer saw his final goal
He knew he'd be a godsend
to the drillers waitin' at the hole.

As he touched the ground he heard a cheer
from the drillers shouting for joy.
"The supplies are already here—
they'll really be proud of this boy!

Now we know that the service is keen
that you get from United Supply
But Elmer Quillback proved what they mean

that THEIR TRUCKS COME ON THE FLY!

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MICHIGAN

Sun Oil Co. had what looked like a certain Trenton oil discovery producer, and the opener of a new Trenton oil pool in Washtenaw County, at its 1 Niehaus, SW NE SW 8-3s-4e, Freedom Township, which was under test following acid treatments in this objective.

Top of Trenton was logged at 3,771 ft. Only reported oil and gas pay was at 3,962-63 ft., although two horizons, one at 3,868-92 ft. and another at 3,992-4,008 ft. were acidized with a total of 3,000 gal. Hole was drilled to 4,038 ft., total depth, and carried free oil natural at the rate of 300 ft. a day prior to acid treatments.

Following acidizations, the 1 Niehaus swabbed and flowed 223 bbl. of oil and 72 bbl. of salt water in 22 hours on the longest single test run since it was treated. Acidization was completed on August 6. After load fluids had been recovered, and through August 11, well had produced a total of 486 bbl. of net oil. Prior to the 22-hour test on August 11, well had been produced for only about 5 to 7 hours a day. During the extended test period, tubing pressures showed from 200 to 300 psi., and casing pressures showed at about 600 to 700 psi. Further testing was in progress.

Although no exact plans were announced, it was generally believed that Sun was preparing to move either to the north or the northwest for its next start in the area, a test which will probably be drilled all the way to the Trenton with rotary, and where the Trenton section will then be cored. The 1 Niehaus was drilled to 3,172 ft., 5-in. casing point, with rotary tools and then drilled with cable tools to the total depth. Pay was penetrated and a 4½-in. liner was run and cemented from 3,043-3,868 ft.. Before liner was set, hole carried about 450 ft. of free oil and 120,000 cu. ft. of gas in 40 hours. A caving hole forced Sun to move rotary back over hole for conditioning before the liner could be run and cemented just above the bridge plug set at about 3,900 ft.

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WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: T. C. Huddle 1 M. C. Martin, J. Antonio Gutierrez A-281. Dry. TD 1,939 ft.

Caroline Hunt Trust Estate 1 Heinen, Carlos Peres, A-663. Dry. TD 7,585 ft.

Precision Prospecting 1 Temple, S. Malone 1069, A-611. Dry. TD 1,570 ft.

Bexar County: Wilson Bros. Oil Co. 1 Jolly, C. Longley. Dry. TD 2,404 ft.

Frio County: Alaska Steamship Co. 2 Dillard & Nixon, BS&F 1, A-120. Dry. TD 5,038 ft.

Appell Oil & Gas Co. 1 Williams, J. E. Lee 14, A-1374. Dry. TD 6,203 ft.

C. G. Dunwoody, Jr. 1 Samuels, T. B. Eastland 101, A-294. Dry. TD 5,700 ft.

Guadalupe County: Harris B. Baker 1 Christ Sceel et ux, Sara DeWitt A-103. Dry. TD 565 ft.

LaSalle County: Humble Oil & Refining Co. 1 Cooke, J. M. Rodriguez 276. Dry. TD 5,442 ft.

McMullen County: George H. Coates B-2 Neuces L&L Co., BS&F 17, A-147. Dry. TD 1,788 ft.

Travis County: P. J. Aylward 1 Ennis, T. B. Westbrook. Dry. TD 1,104 ft.

Wilson County: Morris Cannan and R. B. Mebane A-2 E. V. Ploch, Claiborne Rector A-134. Dry. TD 3,190 ft.

Texas Southern Oil & Gas Co. 1 Jung, S&J de Arocha. Dry. TD 2,870 ft.

District 4

Aransas County: Sun Oil Co. 1 Brundett, J. Smith A-187. Dry. TD 8,507 ft.

Brooks County: Bass & Vessels 1 Chamberlain, Loma Blanca (Francisco Guerra Chapa) Fr. IP 8,400 M.c.f. of gas per day plus 44 bbl. cond. per million, 61.7, perfs. 7,806-16 ft. Frio. TD 8,900 ft. (Gas-condensate discovery).

Duval County: Gust Tsesmelis A-1 M. B. de F. Barvo, L. Chala 11, A-203. Dry. TD 5,510 ft.

Jim Hogg County: Sun Oil Co. 6 Lewis, Agua Nueva de Arriba. Dry. TD 5,154 ft.

Jim Wells County: Bright & Schiff 1 Lagging, J. Poitevent A-360. Dry. TD 5,135 ft.

Pontiac Refining Co. 1 Sain, Los Presenos de Arriba A-148. Dry. TD 5,436 ft.

Bjarne Rossebo 1 Ralson, Agua Dulce Gr. Dry. TD 6,515 ft.

San Patricio County: J. S. Abercrombie et al 1 Pyron, first addn to Taft Farm Lands. Dry. TD 9,214 ft.

Geier-Jackson, Inc. 1 Cantu, J. J. Welder Ranch. Temp. abd. TD 6,180 ft.

Holly Development Co. 1 De Bose, Welder Ranch. Dry. TD 6,320 ft.

Haroldson L. Hunt, Jr. Tr. and Kirkwood & Co. 1 Mayo, Coleman-Fulton Pasture Lands Subd., IP Shut-in gas well, perfs. 2,632-38 ft. TD 9,415 ft.

Starr County: Blair-Vreeland 2 Rogan Est., El Javali Grant. Dry. TD 1,210 ft.

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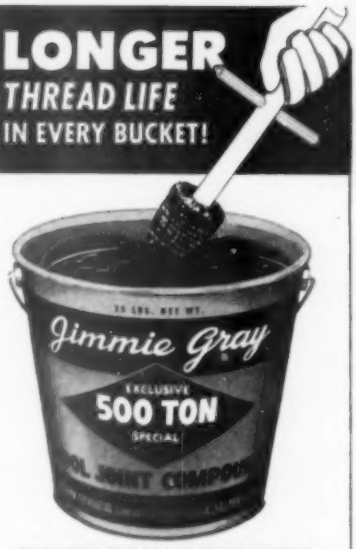

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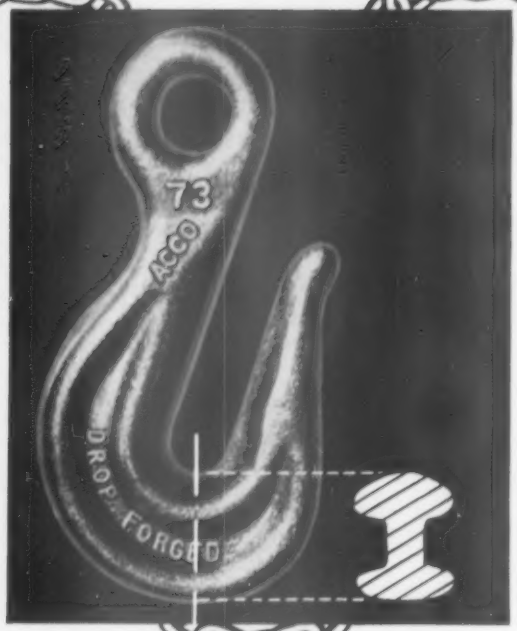

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WILDCAT COMPLETIONS

Webb County: Dulaney Oil Co. 2 Bruni Est., J. M. Aguilar 3. Dry. TD 950 ft.

TEXAS GULF COAST

District 2

Bee County: Alaska, Newman and Calvert Corp. 1 Duge, J&F Russek, A-575. Dry. TD 5,050 ft.

Alaska and Newman Bros. and Calvert Corp. 1 Fakter, G. Garcia, A-167. IP 13,000 M.c.f. of gas per day, open flow, top pay 4,798 ft. TD 4,819 ft. (Gas discovery).

DeWitt County: Kirwood & Co. 1 Hartman, Jas. Quinn, A-395. Dry. TD 8,317 ft.

Karnes County: O. Neathery, Jr. 1 Oetkin, Auld & Carter Subd. Shut in gas well. TD 6,700 ft. perfs. 6,518-28 ft., top pay 6,518 ft. (Gas well).

Refugio County: Sam E. Wilson, Jr. 1 C. L. Lehman et al, Refugio Blacklands, Section 5. Dry. TD 7,620 ft.

District 3

Brazoria County: E. Cockrell, Jr. 4 Brock "A", S. F. Austin ½ Lge. A-21. IP 23,800 M.c.f. of gas per day, Siphonina sand 5,965-75 ft. TD 6,346 ft. (New pay at South Stratton Ridge).

E. Cockrell, Jr. 4 Chilton, Austin & Williams A-145. IP 400 M.c.f. of gas per day, open flow, Miocene 3,680-85 ft. TD 4,676 ft. (New pay on east flank Stratton Ridge).

Dillard & Waltermire and Alfred C. Glassell, Jr. 1 Oliver, H&TB A-478. IP 15,000 M.c.f. of gas per day, open flow, lower Frio 10,153-158 ft., GOR 67,140:1. TD 10,637 ft. (Gas well).

Chambers County: Jay Simmons 1 Davenport, T&NO 29, A-266. Dry. TD 8,565 ft.

Colorado County: W. Stewart Boyle 1 Obenhaus, Micah Andrews A-64. Dry. TD 7,013 ft.

C. H. Osmond, Hill & Hill, and A. W. Cherry 1 J. F. Frnka Unit, Sam Kennelly Lge, A-30. IP 16,000 M.c.f. of gas per day, Yegua, open flow, 1,076 M.c.f. 10/64-in., GOR 84,500:1. top pay 6,422 ft. TD 10,019 ft. (New pay at Kennelly).

Fayette County: M. M. Miller 1 Gleckler et al, Anna Powell Lge, A-257. Dry. TD 4,183 ft.

Galveston County: Russell Maguire 1 Adriance, Rafael Basquez, A-32. Dry. TD 10,503 ft.

Hardin County: T. J. Ahern et al 1 Krimmel, Jas. Cooper. Dry. TD 6,499 ft.

Harris County: Alex W. Head and John L. Welsh, Jr. 1 Thos. W. Moore et al, Aug. Whitlock A-793. Dry. TD 8,978 ft.

Jefferson County, Deep South Oil Co. of Texas 18 Security Bank, T&NO 175. IP 245 BOPD, top pay 9,109 ft., 31.2°, GOR 673:1. perfs. 9,106-10 ft. TD 10,484 ft. (New pay at West Big Hill).

Liberty County: Hassie Hunt Trust 1 E. W. Boyt et al, T&NO 34, A-34. Dry. TD 8,611 ft.

Matagorda County: Jack W. Frazier and J. B. Ferguson 1 O. D. Hodge, Jr. Est., Z. Woods A-108. Dry. TD 9,016 ft.

Union Producing Co. 1 State Tract 100-E, Matagorda Bay, Tr. 100 Matagorda Bay. IP 10,600 M.c.f. of gas per day, open flow, 6,647-53 ft., Miocene, GOR 500,000:1, 60°. TD 6,836 ft. (New pay at Kain).

Montgomery County: Humble Oil & Refining Co. 1 Federal Roy Co. et al, John Bricker A-71. IP 7,400 M.c.f. of gas per day, open flow, Cockfield, 6,232-41

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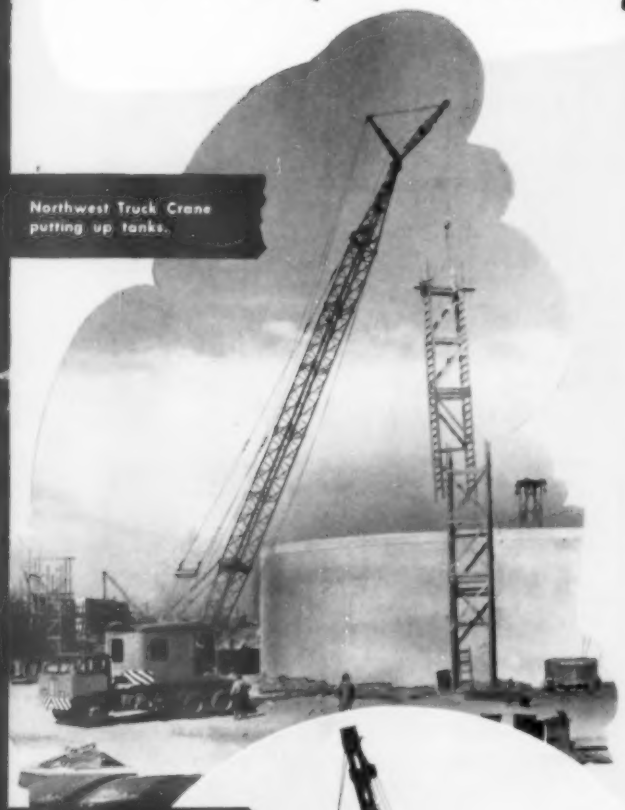

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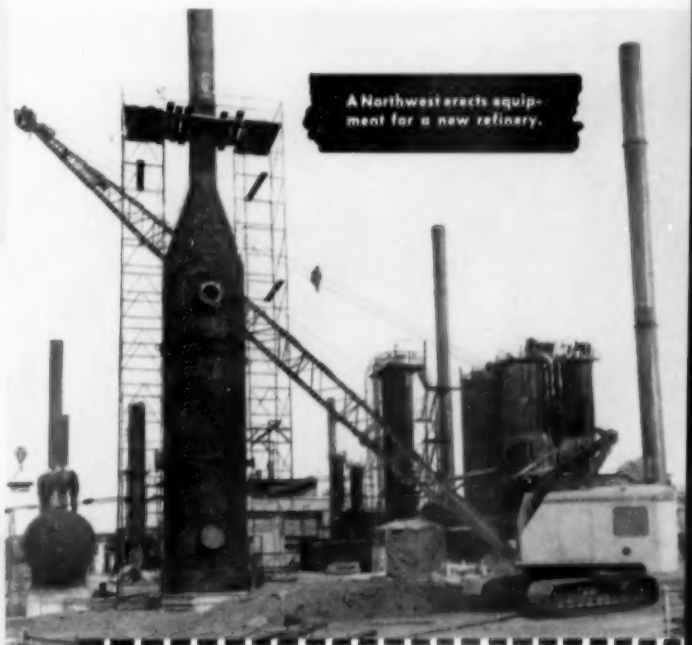

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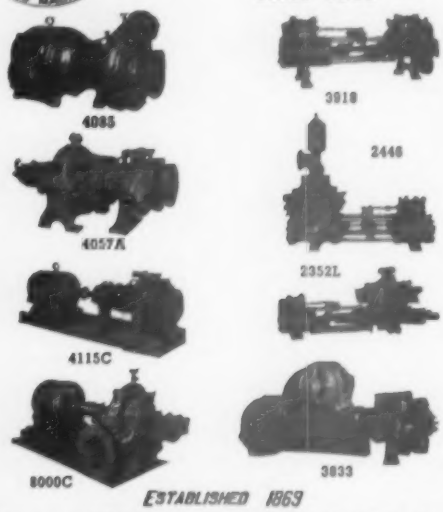

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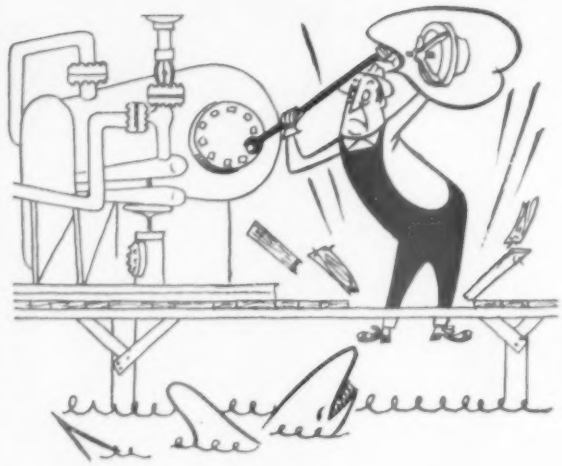

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WILDCAT COMPLETIONS

ft. GOR 98,000:1, 56.6°. TD 6,385 ft. (New pay at Conroe townsite).

Newton County: Christie, Mitchell & Mitchell 2 Hankamer et al, J. C. Patten A-711. IPF 100 BOPD, 10/64-in., 38°, perfs. 8,197-8,207 ft. TD 8,712 ft. (New pay at Sabina Tram West).

Orange County: Lloyd H. Smith, Inc. 1 Kyle 160-ac. Gas Unit, William Allen A-28. Dry. TD 9,704 ft.

Wharton County: Humble 1 Armit Thomas et al, Greffin Wilgus A-493. Dry. TD 10,000 ft.

EAST TEXAS

Cherokee County: R. L. Foree and E. L. Wilson 1 Sides, W. Arnold Sur. A-71. Dry. TD 5,205 ft.

Limestone County: BDK Oil Co. 1 Standmire, A. Varela 11 League Grant. Dry. TD 3,547 ft.

Caroline Hunt Trust Estate 1 Ward, Pedro Varela Grant A-30. Dry. TD 1,330 ft.

TEXAS PANHANDLE

Hansford County: Colorado Oil & Gas Co. 1 Steele, 45-49-H&TC. IP 4,800 M.c.f. of gas per day, 5,256-68 ft. Morrow. TD 7,590 ft. (Gas discovery).

Ochiltree County: Skelly Oil Co. 1 Knutzon, 45-10-H&TC. Dry. TD 7,500 ft.

Roberts County: Phillips Petroleum Co. 5 Price-strat, 2-172-I&GN. Dry. TD 3,200 ft.

Phillips 6 Price-strat, 2-174-I&GN. Dry. 3,250 ft.

Phillips 7 Price-strat, 2-198-I&GN. Dry. TD 3,200 ft.

WEST CENTRAL TEXAS

Brown County: Jess Hickey Oil Corp. 1 Moseley, T. M. Whittington Sur. 618. Dry. TD 1,800 ft.

Callahan County: Clark & Cowden Production Co. 1 General Crude Oil Co., Walter Converse Sur. 333. Dry. TD 1,609 ft.

Chester Imes and Gilchrist Drilling Co. 1 Rose, 7-8-SPRR. Dry. TD 4,060 ft.

Sun Oil Co. 1 Guyton, 320-5-SPRR. Dry. TD 4,104 ft.

Coleman County: Brown Drilling Co. and Western Petroleum Co. 1 Blair, 20-1-GH&H. Dry. TD 3,000 ft.

Davis & Davis, Inc. 1 Harper, Blk. 106, J. Matson Sur. 273. Dry. TD 1,995 ft.

Davis Drilling Co. 1 Miller, Sec. 728, David Breeding Sur. Dry. TD 2,125 ft.

Haskell County: Trans-Tex Drilling Co. 1 Kimbrough, 39-1-H&TC. Dry. TD 5,245 ft.

Jones County: Fletcher Oil & Gas Co. 1 Stuart, Sec. 7, BAL Sur. Dry. TD 2,460 ft.

Fox & Ransdell 1 Foy, Samuel Jones Sur. 266. Dry. TD 3,205 ft.

Lester & Duffield, Inc. 1 Breland, Sec. 98, BBB&C Sur. Dry. TD 2,557 ft.

Frank Love and Feldt & Robinson 1 Huddleston, 36 2-SPRR, new pay in Huddleston field. IP 145 BOPD, ¼-in., TP 340 psi., GOR 1,200 cu. ft., 46°, lower Strawn perforations 4,760-68 ft. TD 4,902 ft.

Jack A. Stroube 1 Pittard, 13-1-T&NO. Dry. TD 2,930 ft.

Ted Weiner 1 Hill, E. Daggett Sur. 126. Dry. TD 3,410 ft.

Shackelford County: W. H. Green 1 Phillips, 61-14-T&P. Dry. TD 2,006 ft.

Throckmorton County: Burk Royalty Co. 2-A Travis CSL, Sec. 49, Travis CSL. Dry. TD 3,946 ft.

D. G. Gordan 1 Lunsford, Sec. 945, TE&L Sur. IP 310 BOPD, 14/64-in., TP 480 psi., GOR 640 cu. ft., 43°, Caddo lime perforations 4,098-4,108 ft. TD 4,339 ft.

NORTH TEXAS

Archer County: Ada Oil Co. 1 Wolf, Sec. 2, SPRR Sur. A-1300. IPP 55 BOPD, Miss. lime 5,214-16 ft., 44°. TD 5,227 ft.

Bailey & Lofton 1 Hall, Blk. 1, A. Nunley Sur. IPP 83 BOPD, Strawn 3,021-30 ft., 40°. TD 3,217 ft. (Oil discovery).

Harvey Drilling Co. 1 Meurer, Blk. 79, Clark & Plumb Subd. Blk. 4, IPP 96 BOPD, Strawn pay 3,496 ft., 41.8°. TD 3,501 ft. (Oil discovery).

James W. Harvey 2 Cowan & McKinney, T. P. Glass Sur. A-141. Dry. TD 1,450 ft.

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WILDCAT COMPLETIONS

Bill Lisle et al 1 Ickert, Isaac Holman Sur. A-162. IPP 22 BOPD, sand 1,202 ft., 39°. TD 1,204 ft.

Megargel Drilling Co. and Glenn Cooper 1 Young, TE&L Sur. 2431. Dry. TD 1,477 ft.

Persky Bros. Oil Co. 1 Garvey et al, TE&L Sur. Blk. 1954. TD 870 ft. (Oil well).

Vandivert & Kitto 1 DeBus, Sec. 2, SPRR Sur. A-941. Dry. TD 705 ft.

Baylor County: W. A. Lofton and R. V. Gorman et al 1 Mary Ella & Mattie Todd Parks, Sec. 25-Blk. 1, D&WRR. Dry. TD 2,003 ft.

Clay County: L. T. Burns Est 1-A Olsen, Blk. 81, Wood CSL. A-705. TD 4,450 ft.

L. T. Burns Est. 1 Zotz, Lot 27, Blk. 2, Clark & Plumb Subd. IPF 130 BOPD, 12/62-in., 43°, open hole, top pay 5,537 ft. Caddo discovery. TD 5,549 ft. (Oil discovery).

Tom B. Medders 1-C Howard Est., Blk. 32, T. J. Belcher Subd. Dry. TD 4,778 ft.

Cooke County: Brown-Martin & Harrison 1 Alexander Bros., H. Nail Sur. A-790. IPP 8 BOPD, 26°, perfs. 1,166-79 ft., Strawn. TD 1,303 ft.

Howell, Holloway & Howell 1 Hudspeth, Bushnell Garner Sur. A-346. Dry. TD 3,732 ft.

Grayson County: Larson & Thomas 1 Marshall, C. C. Walker Sur. A-1370. Dry. TD 4,705 ft.

L. O. McMillian 1 Hejny, J. S. Thom Sur. A-1190. Dry. TD 6,843 ft.

Jack County: Tom B. Medders 1 Hoefle "C", Sec. 8, J. W. Barrett Sur. A-48. Dry. TD 3,702 ft.

Triad Drilling Co. 1 Steward et al, Sec. 2, BBB&C Sur. A-1916. IPF 113 BOPD, 24/64-in., 42°, Bryson sand 3,751-53 ft. TD 3,756 ft.

W. C. Young-Timberlake & Kelleher 1 Carpenter, Jas. Cook Sur. A-153. Dry. TD 2,660 ft.

Knox County: D. D. Drilling Co. 1 Cartwright, 73-45, H&TC. Dry. TD 1,688 ft.

D. D. Drilling Co. 2 Cartwright, 73-45, H&TC. Dry. TD 1,670 ft.

Wichita County: Hale & West 2 Allison, GC&SF A-492. Dry. TD 4,362 ft.

M. W. McCracken 1 Barwise, Sec. 838, James Cole A-37. Dry. TD 4,510 ft.

Frank Wood 1-H J. E. Roller Est., W. Grady Sur. A-357. Dry. TD 2,010 ft.

Frank Wood 1-I J. E. Roller Est., W. Grady Sur. A-357. Dry. TD 2,100 ft.

Wilbarger County: Dublin-Kiel 1-V W. T. Waggoner, 40-4, H&TC. Dry. TD 2,005 ft.

1-Y W. T. Waggoner Est., 48-4, H&TC. Dry. TD 2,505 ft.

J. O. Hancock 1-C W. T. Waggoner Est., Blk. 1, SPRR. Dry. TD 2,010 ft.

Wise County: Lone Star Production Co. 1-A Young Bogy, A. Clendenin Sur. IP 2,400 M.c.f. of gas per day. TD 6,099 ft. (Gas well).

Young County: Ada Oil Co. 2 Young, BBB&C Sur. A-28. Dry. TD 2,576 ft.

Aries Oil Co. 1 M. K. Graham Est., TE&L Sur. 2904. Dry. TD 3,787 ft.

Rankin, Karper & The General Tire & Rubber Co. 1 Robertson, TE&L Sur. 1577, A-927. IPF 72 BOPD, 8/64-in., 41°, Strawn 3,544-51 ft. TD 4,406 ft.

WEST TEXAS

Andrews County: Ralph Lowe 1 Sloan, 4-A-43, PSL. IPF 3,006 BOPD, ¾-in., GOR 370:1, 43.8°, perfs. 12,260-320 ft. Ellenburger. TD 12,368 ft. (One mile south Extension to Deep Rock Ellenburger field).

Borden County: Hanley Co. 1 Beal "B", 23-31, T-3-N, T&P. IPF 230 BOPD, 28/64-in., GOR 820:1, 40.7°, perfs. open hole, top Reef pay 7,652 ft. TD 7,711 ft.

Kay Kimbell et al 1 Beal, 8-30, T-3-Nn, T&P. Dry. TD 7,680 ft.

Cochran County: W. C. Murphy Drilling Co. et al 1 Starnes, Sec. 59, Harrison & Brown. Dry. TD 5,124 ft.

Concho County: Allison & Prestridge 1 Sims, E. Grobe Sur. 47. Dry. TD 4,190 ft.

Ector County: Felmont Oil Corp. et al 1 Eidson, 10-B-14, PSL. Dry. TD 8,851 ft.

Howard County: Southern Minerals Corp. 1 Homan, 45-33, T-3-N, T&P. Dry. TD 9,090 ft.

Kent County: J. Ray McDermott & Co., Inc. 1 May, 49-4, H&GN. Dry. TD 7,338 ft.

Lynn County: Hancock Oil Co. 1 Payne, Sec. 1265, J. H. Gibson Sur. Dry. TD 3,919 ft.

McCulloch County: Robert Kamon et al 1 McNeeley, Sec. 1337, Doris Jordt Sur. IPP 108 BOPD, GOR 600:1, 34°, perfs. 1,728-33 ft. TD 1,781 ft.

Mitchell County: C. B. Drilling Co. and W. R. Reid 1 Ellwood Est., 13-16, SPRR. Dry. TD 7,417 ft.

Pecos County: J. W. Gaddy 1 Girvin, 60-11, H&GN. Dry. TD 2,470 ft.

W. R. Weaver 1 Puckett, 103-3, T&P. Dry. TD 3,504 ft.

Schleicher County: Anderson-Prichard Oil Corp. 1 McIntosh, 82-K, GH&SA. Dry. TD 5,806 ft.

A. A. Cameron 1 Ahrens, 71-H, GH&SA. Dry. TD 6,360 ft.

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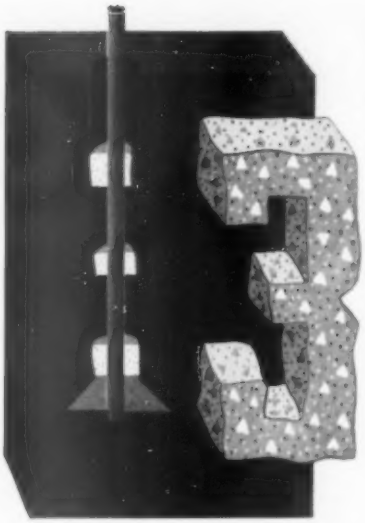

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WILDCAT COMPLETIONS

Sterling County: L. C. Ellish and Aldridge & Stroud Production Co. 1-18 W. L. Foster, Jr., 18-11, SPRR. Dry. TD 1,367 ft.

Sutton County: Western Drilling Co., Inc. 3 Wallace, 67-14, TW&NG. Dry. TD 5,007 ft.

Terry County: Midwest Oil Corp. 1 Herring, 15-C-37, PSL. Dry. TD 5,063 ft.

Tom Green County: American Republics Corp. 1 Henneig et al, Joshua S. Grant Sur. 6, A-5536. Dry. TD 5,840 ft.

Bridwell Oil Co. 1 Kennemer "B", Charles Reppien Sur. 636. Dry. TD 6,590 ft.

John J. Eisner 1 Perry, J. M. McLeod Sur. 84. Dry. TD 5,160 ft.

Lowry Oil Co. 1 Johnson, 8-24, H&TC. Dry. TD 6,257 ft.

Stanolind Oil & Gas Co. 1 Willis Johnson "L", 40-25, H&TC. Dry. TD 5,775 ft.

WEST TEXAS BORDER COUNTIES

Runnels County: Falcon Oil Co. and Revele Royalty Co. 1 Huffines, J. J. Taylor Sur. 541 Dry. TD 4,462 ft. Elev. 1,867 ft., Caddo 4,442 ft.

Humble Oil & Refining Co. 3 Tyree, B. G. Hall Sur. 437. Dry. TD 4,677 ft.

Thos D. Humphrey & Sons 1 Gentry, J. C. Taylor Sur. 804, A-983. IPP 156.4 BOPD, 38°, GOR 820 cu. ft., pay 4,282 ft. TD 5,288 ft.

Stonewall County: The Texas Co. 1 Katie Green, 197-1-H&TC. Dry. TD 6,293 ft. Elev. 1,778 ft., Ellenburger 6,183 ft.

ILLINOIS

Hamilton County: Gulf Refining Co. 1 Walden, NE NE NW 31-4s-7e. Dry. TD 3,629 ft.

MICHIGAN

Barry County: Davidson & Winchester 1 Pierce, NW NW SE 12-1n-9w. IPP 10 BOPD, Traverse lime 1,861 ft., pay 1,865-72 ft., TD 1,872 ft. (Extends Hope pool.)

Cheboygan County: Ohio Oil Co. 1 State-Maple Grove, SW SW SW 3-33n-1e. Dry. TD 3,982 ft., in Niagaran.

Oakland County: Taggart Bros. Gas Co. 2 Mrock, SW NW NE 32-1n-8e. Dry. TD 4,802 ft. in Trenton lime.

Oceana County: Cook Petroleum Co. 1 Martin, NE NW NE 2-16n-16w. Dry. TD 2,439 ft. in Dundee.

PENNSYLVANIA

Westmoreland County, Derry Township: Mid East Oil Co. 1 Frank Litvik* Dry. Tully 7,180 ft., Onondaga 7,755 ft., chert 7,765 ft., Oriskany sand 7,893 ft., Helderberg 7,915 ft. TD 7,977 ft.

WEST VIRGINIA

Glade district: Nelson W. Taylor, Agent 1 A. C. & Olive Thomas, elevation 2,303 ft., 696,000 cu. ft. gas, after Sandfrac, Maxon sand 1,478-1,541 ft., gas 1,495-1,505 ft. TD 1,541 ft.

Gregory Gas Co. H. F. Howard, elevation 2,250 ft. Dry. Maxon sand. T.D. 1,516 ft.

FLORIDA

Walton County: W. L. Hawkins 1 Dorothy Coffen, 14-2s-21w. Dry. TD 6,000 ft. Lower Cretaceous 5,900 ft.

MISSISSIPPI

Adams County: Clinch Drilling Co. 1 Pierce Butler trustee, 15-5n-3w. Dry. TD 6,856 ft.

H. L. Rowley 1 Junkin et al, 52-8n-2w. Dry. TD 6,311 ft.

SOUTH LOUISIANA

Acadia Parish: J. P. Owen et al 1 Sweeney, 62-9s-2w. Dry. TD 10,563 ft.

Beauregard Parish: Texas Gulf Producing Co. 1 Herpin, 19-6s-8w. IPF 22½ BCPD, 750 M.c.f. of gas per day, ⅛-in. Shut in, top pay 7,275 ft. TD 7,368 ft. (Oil discovery).

Cameron Parish: Magnolia Petroleum Co. 5 Abel West heirs, 36-14s-10w. IPF 34 BCPD, 193 M.c.f. of gas per day, 10/64-in., 46.8°, top pay 10,802 ft. TD 10,976 ft. GOR 5804:1. (Gas-condensate extension to Cameron field).

Iberia Parish: The Texas Co. 32 St. Lse-Lake Fausse Pointe, 11s-8e. IPF 231 BOPD, 1,749 M.c.f. of gas per day, 9/64-in., 48.6°, top pay 12,770 ft. TD 14,002 ft. (Gas-distillate well, new pay at Fausse Pointe field).

Iberville Parish: J. Paul Ratliff, Jr. 1 Angelloz, 40-7s-10e. Dry. TD 10,450 ft.

Jefferson Parish: The Texas Crude Oil Co. 1 Bowsky Unit, 38-12s-10e. Dry. TD 10,010 ft.

Humble Oil & Refining Co. 1-D St. Lse 798, Offshore, IPF 196 BOPD, ⅛-in., 39.8., GOR 912:1, top pay 10,084 ft. perfs. 10,084-10,102 ft. TD 10,242 ft. (New oil sand at Grand Isle Blk. 18).

Lafourche Parish: The California Co. 3 City of New Orleans. Dry. TD 7,968 ft.

Plaquemines Parish: Humble 1 LL&E Co. "O", 19-27e. Dry. TD 13,501 ft.

Rapides Parish: Justiss-Mears Oil Co. 1-D USA, 10-5n-1e. Dry. TD 6,006 ft.

Terrebonne Parish: Caroline Hunt Sands 1 Vernon L. Caldwell et al, 9-16s-16e. Dry. TD 12,918 ft.

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WILDCAT COMPLETIONS

Vermilion Parish: Pan Am Southern Corp. 1 Mouton, 15-13s-2e. Dry. TD 11,520 ft.

NORTH LOUISIANA

Claiborne Parish: Texas Crude Oil Co. 1 G. S. Bailey estate, 8-23n-5w. Dry. TD 10,022 ft.

Concordia Parish: Olin Gas Transmission Corp. C-1 A. B. Learned et al, 27-2n-8e. Dry. TD 9,040 ft. Temp. abd.

S. Lee Ware-Crow Drilling Co., Inc.-T. L. James 1 C. T. McGraw & Co., Inc., C S½ SE NE 5-8n-9e. Dry. TD 6,010 ft.

Ouachita Parish: Carter Oil Co. 1 J. H. Rhymes heirs, 26-17n-4e. IP 5,250 M.c.f. of gas per day, Pettit 5,296-5,313 ft., 24/64-in. TD 9,536 ft. (Gas discovery).

Red River Parish: Marvin R. Legrand and R. K. Harrison 2 Earl M. Harter et al, 11-14n-12. Dry. TD 1,732 ft.

Sabine Parish: Skelly Oil Co. 1 Long-Leaf, 4-7n-11w. Dry. TD 6,705 ft.

Winn Parish: R. T. Jameson et al 1 Urania Lumber Co., 5-10n-1e. IPP 20 BOPD, Wilcox open hole 1,480-86 ft. TD 1,486 ft. (Discovery of Cross Roads field).

ARKANSAS

Clay County: Ralph Landrey 1 Bridges, C SW NW NE 13-21n-8e. Dry. TD 1,000 ft.

Columbia County: Hunt Oil Co. et al 1 Alvin Moore, C SW NW 32-18s-20w. Dry. TD 5,220 ft.

Lafayette County: Weiser-Brown Oil Co. and Marine Oil Co. 1 Marine Oil Co. et al, 30-16s-23w. Dry. TD 3,083 ft.

OKLAHOMA

Caddo County: Anderson-Prichard Oil Corp. 1 Bert, NW NW SE 20-6n-12w. Dry. TD 2,750 ft.

Creek County: Simon & Lebow 1 Redford, SE NE SE 2-16n-7e. Dry. TD 2,876 ft.

Garfield County: Sinclair Oil & Gas Co. 1 Lovell, SE SE SW 33-21n-5w. Dry. TD 7,047 ft.

Garvin County: Ohio Oil Co. 1 Newbern, SW SW SE 14-4n-2e. Dry. TD 3,050 ft.

Blackwood & Nichols 1 Turner, SW NW SE 16-2n-1w. Dry. TD 6,197 ft.

Grady County: Woodward & Co. 1 Hawpe, NW NW NW 6-3n-1w. IPF 90 BOPD, 3,310-18; 348 BOPD, 3,494-3,506 ft., ¾-in. TD 5,625 ft. (Oil discovery).

Hughes County: Jack Robbinson 2 Cotton, SW SE SE 14-5n-9e. Dry. TD 1,128 ft.

Kay County: O. H. Parker 1 Alexander, NW NW SE 32-27n-4e. IPF 100 BOPD, Skinner sand 3,201-11 ft., 53°, ½-in. TD 3,263 ft. (Oil discovery).

Logan County: Inland Oil Co. et al 1 Hunter, NE NW SE 12-15n-1w. Dry. TD 5,837 ft.

Inland 1 Durham, NE NE SE 12-15n-2w. Dry. TD 6,097 ft.

Summit Drilling Co. 1 Graff, NE NE SW 2-17n-3w. Dry. TD 6,155 ft.

Mayes County: Service Drilling Co. 1 Goltra, SW SE SW 19-23n-18e. Dry. TD 821 ft.

Okfulskee County: George W. Deck, Jr. et al 1 Sandlin, NW SW NE 33-10n-11e. Dry. TD 3,010 ft.

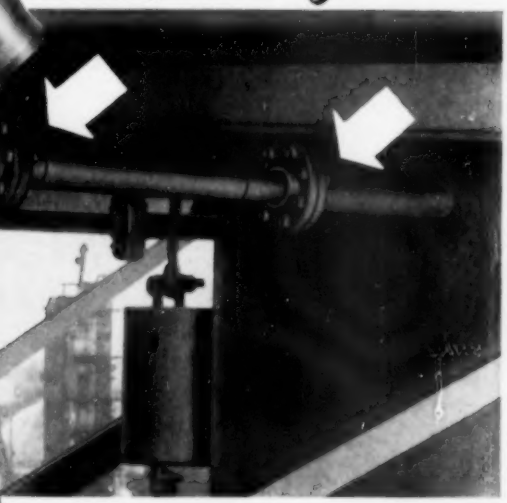
Jones-Shelburne, Pellow 1 Hayes-Buttram, NW NE SW 23-13n-7e. Dry. TD 4,375 ft.

Payne County: R. L. Kemp 1 Anderson, SW SW SW 32-18n-6e. Dry. TD 3,462 ft.

Rogers County: General Ira Hamilburg et al 2 Craig, SW NE NE 32-22n-15e. IPF 120 BOPD, Burgess sand 918-926 ft., 37°, ⅛-in. TD 926 ft. (Oil discovery).

Barco Flexible STRUT* Joints

* For Structural Applications



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COMPLETE LINE—Barco manufactures Strut Joints in the following sizes and load capacities: 1"—6,000 lbs., 1½"—8,000 lbs., 2"—12,000 lbs., 3"—20,000 lbs., 4"—50,000 lbs., 6"—130,000 lbs. Joints are made with welding ends for field or shop use. Unique "Bar-Moly" treatment of wearing parts provides a permanent dry lubrication for long service with little or no maintenance.

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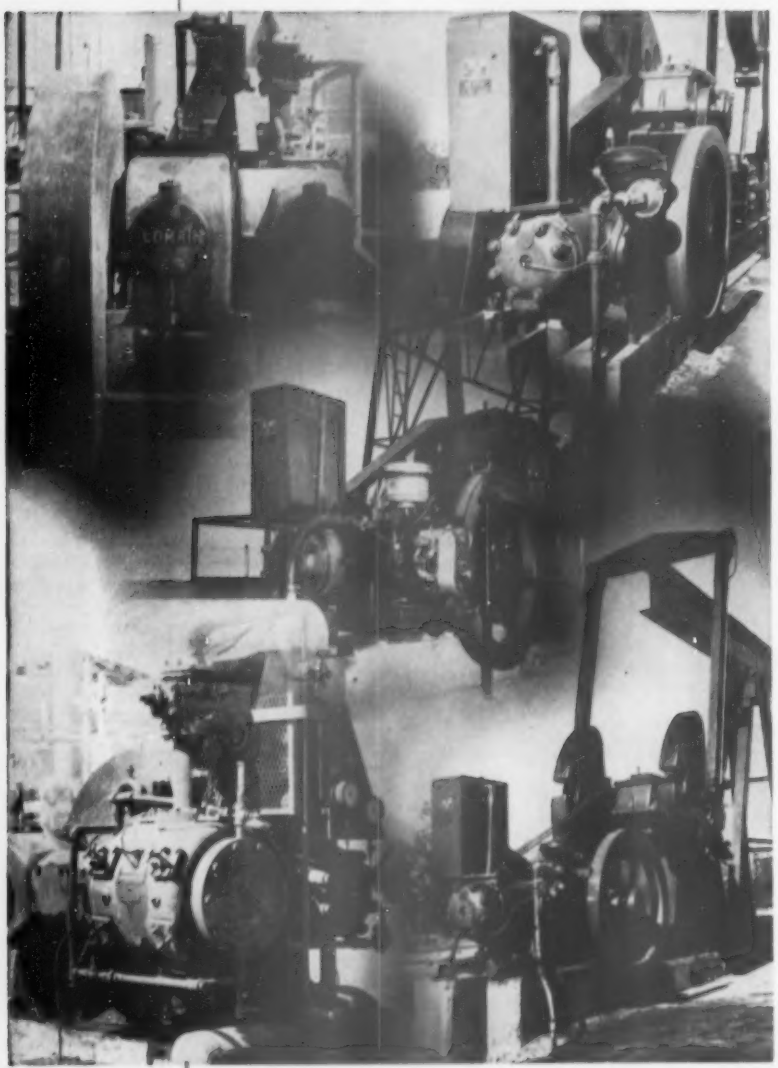

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WILDCAT COMPLETIONS

Washita County: Shell Oil Co. 1 Galloway, SE SE SE 21-8n-18w. Dry. TD 6,500 ft.

KANSAS

Barber County. Musgrove Petroleum 1 Early, SE SE SW 4-33s-11w. IP 8,256 M.c.f. of gas per day, Miss. 4,425-58 ft. TD 4,983 ft. (Opens Rhodes North gas pool).

Imperial Drilling Co. 1 Ott "A", SE NW SW 6-34s-13w. IP 2,000 M.c.f. est. Miss. 4,889-95 ft. TD 5,010 ft. (Gas discovery).

Clark County: Shell Oil Co. 1 Stratton, SE SE NW 12-30s-25w. Dry. TD 6,679 ft. Arbuckle 6,579 ft.

Ellis County: El Dorado Refining Co. 1 Davis & Howard, SE NW SE 24-11s-20w. Dry. TD 3,602 ft.

Transit 1 Niernberger, SE SE SW 11-13s-20w. Dry. TD 3,815 ft.

Graham County: Mid-Continent Petroleum Corp. 1 Dietz, SW SW NW 8-10s-23w. Dry. TD 4,348 ft.

Greenwood County: Bedell & Catt 1 South, NW NW SE 36-23s-10e. Dry. TD 2,073 ft.

Pawnee County: Republic Natural Gas Corp. 1 Harmes-Spruill, NE SW SW 15-20s-20w. Dry. TD 4,506 ft.

Phillips County: J. J. Lynn 1 Fischli, SE SE NE 21-4s-19w. Dry. TD 3,550 ft.

Reno County: Globe Oil Co. 1 Drake, SE NW NW 7-22s-9w. Dry. TD 3,721 ft.

Smith County: Bennett & Roberts 1 Bates, SW SW NE 21-1s-15w. Dry. TD 4,205 ft.

Stafford County: Gulf Oil Corp. 1 Saterlee, NE NE NW 31-24s-14w. IPF 45 BOPD, Sooy 4,168-77 ft. TD 4,240 ft. (Opens Saterlee field).

Franco Central 1 Russell, NE NW SE 31-21s-14w. Dry. TD 3,881 ft.

Glickman Oil Co. 1 McCune, SE SE NE 4-25s-12w. Dry. TD 4,170 ft.

Thomas County: Proctor-Mack et al 1 Maier, NE NE NW 19-9s-31w. Dry. TD 4,778 ft.

Wabaunsee County: Sohio Petroleum Co. 1 Ashburn, SE NE SE 29-14s-10e. Dry. TD 3,492 ft.

NEBRASKA

Cheyenne County, Pelster: Harper-Turner Oil Co. and Sanford Producing Co. 1 Pelster, S½ SW SW 27-17n-50w. IPP 35 BOPD, "D" sand discovery, new field. TD 4,883 ft.

New Drilling Co. 1 Deaver, C SE SE 33-14n-52w. Dry. TD 5,410 ft.

Ohio Oil Co. 1 Frerichs, SE NE NE 15-15n-48w. Dry. TD 4,570 ft.

Kimball County: Harper-Turner and Dunn & Boreing 1 McPeak, NW NW NW 18-13n-53w. Dry. TD 5,966 ft.

Miracle & Fifer 1 Swenson, SW SW NE 23-13n-54w. Dry. TD 6,075 ft.

SOUTH DAKOTA

Custer County: Emil B. Kucera 2-A Sara Coffing, NE NE NW 34-6s-2e. Dry. TD 1,980 ft.

Kucera 3 Coffing, NW NE NW 34-6s-2e. Dry. TD 1,517 ft. Leo.

NORTH DAKOTA

Benson County: Shell 1 Myhre, SE NE 16-152n-68w. Dry. TD 2,815 ft. Devonian.

Divide County: T. F. Hodge 1 State, NE NE 36-160n-95w. Dry. TD 8,264 ft. Lodgepole.

Sioux County: Ohio Oil Co. 1 Standing Rock Sioux Tribal, NE SW 29-131n-80w. Dry. TD 5,906 ft. Winnipeg.

Ward County: W. H. Hunt 1 Neumann, SW SE 33-152n-82w. Dry. TD 9,653 ft. Winnipeg.

Wells County: Caroline Hunt Trust Estate 1 Larson, NW NE 32-150n-70w. Dry. TD 5,034 ft. Winnipeg.

CALIFORNIA

Kern County: Harry Magee, Operator 1 Bishop, 10-28s-28e. Dry. TD 1,449 ft.

Pacific Western Oil Corp. 37A-2 Socal-Hagood, 2-30s-20e. Dry. TD 3,014 ft.

Standard Oil Co. of California 25-20 KCL 36, 20-29s-27e. Dry. TD 4,457 ft.

Wilrich Dev. Co. 1 Wilrich-Theta, 30-28e-20e. Dry. TD 2,559 ft.

Monterey County: The Texas Co. 1 Wood (NCT-1), 25-23s-11e. Dry. TD 3,824 ft.

Riverside County: Eddie Fisher, 1 Stewart, 34-6s-4e. Dry. TD 2,605 ft.

San Luis Obispo County: Shell Oil Co. 32-22 Smith One, 22-30s-19e. Dry. TD 5,513 ft.

Santa Barbara County: Richfield Oil Corp. 84-5 Cox, 5-9n-26w. Dry. TD 8,208 ft.

Union Oil Co. 1 Bognuda, 36-11n-35w. Dry. TD 2,130 ft.

Tulare County: Fleetwood Oil Co. 6 Gardner, 35-22s-27e. Dry. TD 921 ft.

B. W. Freudenthal, James P. Dowling and J. T. Holt, 1 Adams, 10-22s-27e. Dry. TD 1,121 ft.

WASHINGTON

Grays Harbor County: Continental Oil Co. 1 Grays Harbor Co., 24-19n-12w. Dry. TD 3,450 ft.

WYOMING

Fremont County: Sohio Petroleum Co. 1 Government-Dorough, SW SW NE 20-29n-95w. Dry. TD 5,930 ft. Dakota.

Sheridan County, South Ash Creek: Phillips Petroleum Co. 1 Scott "A," C SW SE 28-58n-85w. Dry. TD 5,100 ft. Shannon.

UTAH

Utah County, Pond Town Creek unit: Southern Production Co. 1 Federal, Lot 5-34-11s-6e(SLM). Dry. TD 7,720 ft. Ferron.

COLORADO

Logan County: Falcon Seaboard 1 Fluharty, SW SW NW 30-10n-52w. Dry. TD 5,019 ft.

Miracle & Fifer and B. S. & P. 1 Mittelstadt, NE NE SW 4-8n-52w. Dry. TD 4,765 ft.

Morgan County: H. C. Arnold and Calvert Drilling Co. 1 Federal Land Bank and R. M. Boorom, C NE NW 14-6n-58w. Dry. TD 6,384 ft.

McMahon-Bullinton 1 Roberts, C SE SE 23-4n-57w. Dry. TD 5,584 ft.

Western Crude Marketers, Inc. 1 Bird-Brant, C NW NE 26-3n-59w. Dry. TD 6,075 ft.

Washington County: Guy Mabee Drilling Co. 1 Creswell, NW NW SW 6-1n-54w. Dry. TD 5,160 ft.

Shell Oil Co. 1 Claney, C SW SW 33-2s-52w. Dry. TD 4,647 ft.

J. E. Smith and V. King 1 Windolph, SW SW SE 20-2n-54w. IP 4,500 M.c.f. of gas per day, 2 BOPH, "D" sand gas discovery, new field, Stony Point, TD 4,860 ft.

Weld County: Mid-Continent-O'Donnell & Edmondson 1 Bowen-Petersen State, C SW SW 36-2n-61w. Dry. TD 6,800 ft.

MANITOBA

Dome-Harris-Cox 5-31 Broomhill, LSD 5, 31-5-27w1. Dry. TD 3,434 ft.

Widnery-Canadian Superior 3-3 Broomhill, LSD 3, 3-5-28w1. Dry. TD 3,655 ft.

SASKATCHEWAN

Socony-Sohio 11-14 Briercrest, LSD 14, 11-14-24w2. Dry. TD 6,110 ft.

Phillips-Husky 1 Cabri, LSD 1, 23-24-28w3. Dry. TD 3,327 ft.

British American-Husky-Phillips 15-11 Colfax, LSD 15, 11-12-14w2. Dry. TD 3,917 ft.

British American-Husky-Phillips 5-29 Strawberry Lake, LSD 5, 29-16-13w2. Dry. TD 3,484 ft.

Socony-W-S. 19-4 West Covington, LSD 4, 10-13-17w3. Dry. TD 4,306 ft.

ALBERTA

Union-Imperial 10-32 North Fairydell, LSD 10, 32-58-24w4. Dry. TD 3,900 ft.

Shell-Canadian Superior A-8-22 West Freenglade, LSD 8, 22-41-2w4. Dry. TD 2,545 ft.

Ranchmen's 6-25, LSD 6, 25-35-9w4. Dry. TD 3,016 ft.

Brinkerhoff-Shell A-10-34 Hilda, LSD 10, 34-17-1w4. Dry. TD 3,260 ft.

Leduc-Calmar et al 13-33 Hudson's Bay, LSD 13, 33-41-6w4. Dry. TD 2,920 ft.

Western 27-6 Kaleland, LSD 6, 27-55-13w4. Dry. TD 2,205 ft.

Texaco-Imperial 5-13 Arndt, LSD 5, 13-48-24w4. Dry. TD 6,200 ft.

Hargal-Freehold-Socony 1 Drumheller, LSD 7, 11-29-31w4. Dry. TD 5,835 ft.

Hudson's Bay-Fortune 2 Nestow, LSD 4, 14-60-23w4. Dry. TD 3,330 ft.

Evans-Union 6-31 Twin River, LSD 6, 31-1-20w4. Dry. Dry. TD 4,451 ft.

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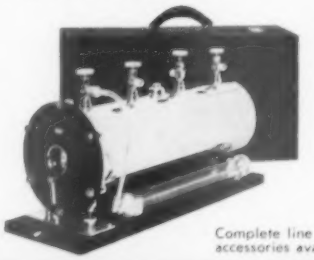

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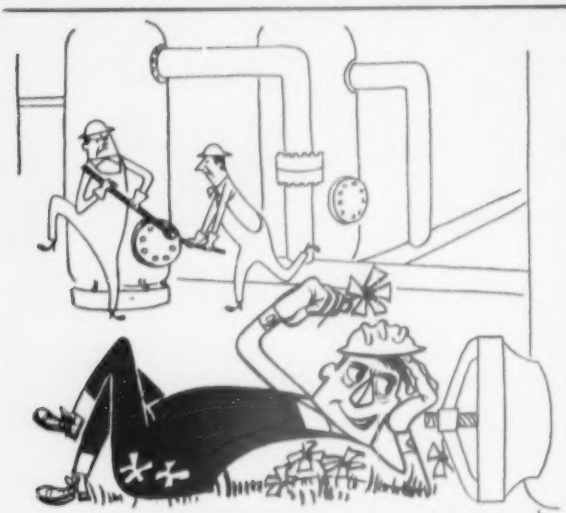

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Sports Enthusiast

Robineau is good racer with horses or octanes

M H. (BUD) ROBINEAU, operator of the largest independent refinery in the Rocky Mountain area, has had remarkable success in the oil industry, but he refuses to let business displace his favorite hobbies—horse racing and tennis.

The youthful-looking president of the Independent Refiners Association of America has won his share of both horse races and tennis matches, but he also has set a speedy pace in the octane race. His Frontier Refining Co.'s plant at Cheyenne, which produced high-test aviation gasoline for military use during World War II, was the first in the Rocky Mountain states to install a catalytic cracking unit for production of automobile fuel for the general public.

Since 1940, when he and his long-time associate, H. E. (Bee) Armitage, organized Frontier Refining Co., the Cheyenne unit has grown from a 750-bbl. skimming plant to a modern 12,-000-bbl. per day refinery.

Robineau, just 40 years old when he helped found Frontier Refining Co., already had a long string of successes behind him in the oil industry.

Founded other firms . . . He joined The Texas Co. shortly after his graduation from college in 1923. After 2 years of sales work, during which he became the company's first zone salesman in western Nebraska, Robineau organized Western Nebraska Oil Co. at Sidney, Neb.

Serving as president and general manager of that company until 1934, Robineau then organized another firm, Bay Petroleum Corp., and served as its president and general manager for 5 years. Later, he became vice president and a partner of Kline, Robineau & Parker, an organization engaged in petroleum and mining ventures.

Sports enthusiast . . . A former semi-professional and professional baseball player, Robineau now devotes a major part of his leisure time to horse racing and tennis.

He won his first tennis championship when he was 15 years old. Since then he has accumulated a number of tennis trophies, including one for winning a 1931 handicap tournament at Cannes, France. He also participated in the Men's Singles at the Denver Country Club in 1945, 1948, 1949, and 1950 and in the National Veterans Singles at Forest Hills in 1950, 1952, and 1953. He currently is a member of the executive committee of the United States Lawn Tennis Association.

Two years ago Robineau was elected president of the Centennial Turf Club, a swank horse-racing establishment near Denver. By subjecting his hobby to the same principles that had proved themselves in his business, he was able to make the club show a profit for the first time since it was organized. He resigned this job last year.

Native of New York . . . Born July 29, 1900 at Syracuse, N. Y., Maurice Henry Robineau attended high school there and later attended Cornell University and Syracuse University before going to Colorado School of Mines, where he received his degree in mining engineering in 1923.

Robineau served with a hospital unit in France during World War I and was transferred to the entertainment service after the armistice; he played a banjo with the American Expeditionary Force's original jazz band. Back in the states, he worked his way through college with his banjo. At one time he played with a Hawaiian orchestra and attracted considerable attention as the world's only blue-eyed Hawaiian.

Robineau is married and has three children. Now 54, he could pass as a man in his thirties if he didn't brag so much about his lone grandchild.

As head of the Independent Refiners Association, Robineau is a man to watch during the next few months. Caught between high crude prices and shaky markets for their products, many small refiners are urging lower field prices or Government control of imports. If the association takes any action to ease its problems all segments of the industry may be affected.

W. M. Decker, Cities Service Oil Co., has been elected president of Oklahoma City Geological Society for the 1954-55 year.

Marvin E. Frankamp, who has been serving as Kansas district geologist for Bishop Oil Co., has resigned to become an independent consultant.

U. S. (Sherman) Cowan has been named superintendent of operations for Oil Basin Pipeline Co. Cowan had been serving in the Billings area with Interstate Oil Pipe Line Co.

Tom H. Kerlin has been named special representative for the drilling division of Warren-Bradshaw Exploration Co. Kerlin was formerly associated with National Associated Petroleum Co. and Fleeger-Riley Drilling Co.

Joseph T. Dawson and **Joseph L. Cramer** have formed Dawson & Cramer Drilling Co. The firm will concentrate on drilling operations in the Denver-Julesburg basin.

H. E. Rowe, Jr., has been named chief petroleum engineer and assistant manager of production for Bay Petroleum Corp. Rowe, who formerly served with Stanolind Oil & Gas Co. and Beach & Talbot, succeeds **Marvin F. Owens,** who resigned.

Forest D. Dorn, former president of Forest Oil Corp., has been named chairman of the board. **Dale H. Dorn** has been elected president of the company, and **David F. Dorn** has been named a member of the board of directors.

Dwight H. Seely, Jr., has been named staff assistant to the division manager of Sohio Petroleum Co.'s Gulf Coast division. Before his promotion, Seely was serving on headquarters staff in Oklahoma City. Other Sohio changes include: **Richard E. Johnston,** promoted to Gulf Coast division engineer; **Stanley A. Hatcher,** named district geophysicist for the Houston district; **L. Bruce Forney,** promoted from acting district geologist of the Houston district to district

PERSONALS

geologist; **Charles A. Arsenault,** promoted to district geophysicist of the Tyler, Tex., district, and **James M. Gibson,** named district superintendent of production operations of the Tyler district.

Thomas A. Atkinson has been named vice president and head of the new exploration and production department of Douglas Oil Co. of California. Atkinson, former Socony-Vacuum Oil Co., Inc., and General Petroleum Corp. official, will direct Douglas' operations in California and Peru.

Fernando Noriega Calmet, former director of petroleum for the Peruvian Government and acting general manager of the government company, Empresa Petrolera Fiscal, has been appointed Peruvian minister of fomento (development), succeeding **Miranda Sousa.**

Kenneth C. Jenner has joined Panhandle Eastern Pipe Line Co. as a corrosion engineer in the pipeline department. **T. H. (Buck) Yocom** has been promoted to assistant superintendent of stores by Panhandle Eastern. Yocom had been serving as field supervisor of stores.

Marshall W. Taylor, II, has been appointed manager of West Canadian Petroleums, Ltd. Taylor, who will be headquartered in Calgary, had previously served with Magnolia Petroleum Co., Schimmel-Taylor Co., and British American Oil Co., Ltd.

Dr. J. C. Pullman has been promoted to manager of technical service of American Cyanamid Co.'s petrochemicals department. Pullman joined Cyanamid in 1943 and has been serving as assistant to the manager of the new product development department.

Ted Hawley, Conrad, Mont., has been appointed to the Montana Oil and Gas Conservation Commission by **Gov. J. H. Aronson.** Hawley replaces **T. R. Barnes,** recently transferred by Shell Oil Co. to Denver.

R. D. Jackson has been promoted to assistant chief engineer of the transportation department of Standard Oil Co. (Ohio). Jackson had been serving as assistant to the chief engineer of Sohio Pipe Line Co. in St. Louis before his promotion.

H. Brady, chief engineer for Williams Brothers Co. in Colombia, has been transferred to the United States.

G. S. Taitt, formerly managing director of Anglo-Egyptian Oilfields, Ltd., and director of the Shell Co. of Egypt, Ltd., has been appointed to a senior position in the production administration of Anglo-Saxon Petroleum Co., Ltd., in London. **H. M. Jones,** general manager, Shell Co. of Egypt, has succeeded Tiatt in the Egyptian operations.

D. E. DAVIS

D. E. Davis has been appointed manager of Standard-Vacuum Oil Co.'s producing department in New York. Davis started his oil career in 1923 with Carter Oil Co. and later served with an affiliate of Standard Oil Co. (N.J.) in Argentina. He joined Stanvac in Indonesia in 1937 and served there until World War II when he joined Creole Petroleum Corp. as assistant division engineer at Maracaibo, Venezuela. Davis succeeds **E. W. Berlin,** whose temporary assignment with Stanvac in Indonesia has been extended.

L. N. Schooler has joined Texas Petroleum Co. in the Venezuelan division as assistant production foreman. Other additions by Texpet include: **H. M. Johnson,** geologist; **R. A. Pittman, Jr.,** special assistant to manager; **Erich A. Schur,** assistant refinery foreman; **R. S. Mahoney,** assistant drilling foreman; **F. G. DellaCorte,** petroleum engineer, and **Joe L. M. Jeko,** refinery operator.

T. W. Kidd, assistant division petroleum engineer for Gulf Oil Corp. at Fort Worth, has been transferred to Odessa, Tex., as zone petroleum engineer. **O. K. Gilbreth, Jr.,** has been transferred from Fort Worth to Roswell, N. M., as zone petroleum engineer. Gilbreth has been serving as reserves administrator.

E. N. Avery has been appointed chairman of the local board of the Shell Co. of Australia, Ltd., in addition to the post of chairman of the Shell refining company in Australia. **L. Luxton** has been made managing director of the Shell Co. of Australia, succeeding Avery. **A. C. Durie,** manager of the London division of Shell-Mex and B.P., Ltd., has been appointed to succeed Luxton as director of the local board of the Shell Co. of Australia.

John M. Lovejoy has been elected a director of Drilling & Exploration Co., Inc.

James Warterfield, pipeline consultant, has been retained by Empresa Colombiana de Petroleo, the Colombian Government oil company, to make an engineering study of the proposed Buenaventura-Cali products line.

Victor Rose, former vice president and director of International Petroleum Co., Ltd., has resigned and returned to Bogota, where he will open an office as consultant to United States firms and industries being established in Colombia.

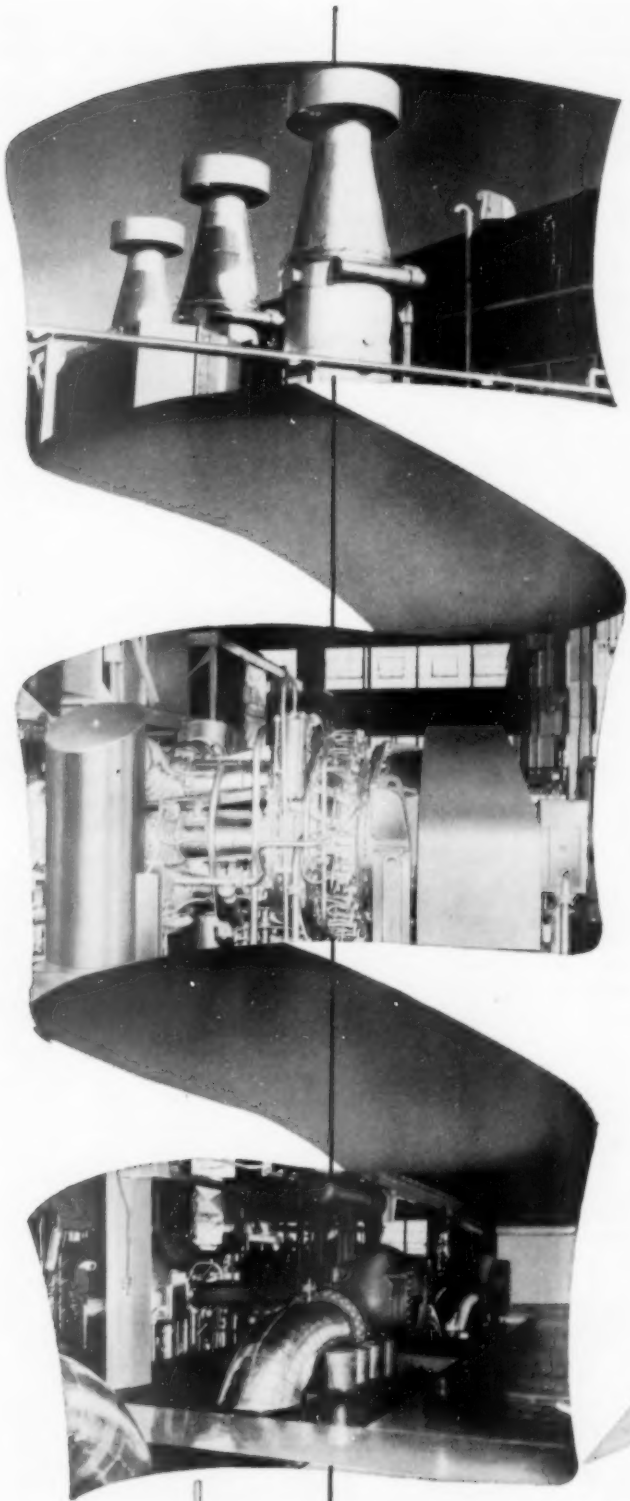
John W. McKnab has resigned as president and general manager of Anschutz Drilling, Inc. McKnab plans to continue his drilling activity under the name of McKnab Drilling, Inc., with offices in Wichita.

James D. Frawley has resigned as assistant to the vice president of Bareco Oil Co.'s microcrystalline wax division to take a position as vice president of Frank Frawley Drilling Co., Tulsa.

Robert Demaree has been named Denver representative for Chicago Corp. Demaree has been active in the Williston basin since its discovery and has served as a director of North Dakota Oil and Gas Association.

Robert J. Moffatt, Shreveport geologist, recently completed 6 years of law study at Centenary College and was admitted to the bar in Louisiana. He plans to specialize in handling cases before the various regulatory bodies in the tri-state area.

G. M. Knebel, Standard Oil Co. (N. J.), and **Marshall Kay,** Columbia University, have been nominated as candidates for the presidency of American Association of Petroleum Geologists. Other nominees for the 1955-56 period include: **Horace D. Thomas,** University of Wyoming, and **Henry N. Toler,** consultant of Jackson, Miss., vice president; **Frank Gouin,** independent producer, Duncan, Okla., and **W. A. Waldschmidt,** consultant, Midland, Tex., secretary-treasurer; and **W. C.**



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PERSONALS

Krumbein, Northwestern University, and **Grover E. Murray,** Louisiana State University, editor.

Russell D. Richardson has been named controller of Tide Water Associated Oil Co. Richardson, who joined Tide Water in 1921, has been serving as regional controller of the company's western division.

Ronald F. Crawford has been named district manager of drilling operations in Oklahoma for Lone Star Producing Co. Crawford had been serving with the company in Athens, Tex., where he was in charge of drilling operations in East Texas.

Jacob Blaustein, a director and member of the executive committee of Pan American Petroleum & Transport Co., has been elected a director of Standard Oil Co. (Ind.) following Pan-Am's merger with Standard.

L. D. Hoblit has been promoted from project leader to group leader in organic pilot plant laboratory at Dow Chemical Co.'s Freeport, Tex., plant. **H. D. Sullivan,** research and development engineer in the laboratory, has been advanced to project leader. **E. P. Maynard, Jr.,** has been promoted from project engineer to project leader in engineering.

J. Thurman Green, formerly with Sun Oil Co.'s production division, has been transferred to Sun Pipe Line Co. where he will organize and direct a safety program.

L. A. Lewis has been promoted to Calgary division exploration manager by Shell Oil Co. Other changes by Shell in Canada include: **G. I. Lewis,** promoted from geologist to senior geologist; **P. F. Moore,** advanced to area stratigrapher, and **J. G. Herringer,** named Calgary division land manager.

T. N. Jordan, Bismarck, N. D., independent, has been reelected president of North Dakota Oil and Gas Association. Other officers elected include: **W. W. Simpson,** Skelly Oil Co., reelected vice president; **Tom Leach,** North American Royalties Co., Bismarck, **Wendell Smith,** Smith and Summers, Bismarck, and **Burrell Harrell,** Worley and Harrel, Williston, N. D., all elected vice presidents; **Ernest Fleck,** Bismarck, secretary, and **A. A. Mayer,** Bismarck, treasurer. **Allan Eastman,** Bismarck, was renamed executive director of the association.

Kenneth J. Palmer, former St. Paul division manager of Clark Oil & Refining Co., has been promoted to regional manager.

Merle L. Bowser has been named to head the structural group of Esso Engineering Co.'s material procurement and contract division.

Nathan H. Gellert, Jr., has been named coordinator of natural gas conversion for Seattle Gas Co. Gellert will be in charge of converting the company's system from manufactured gas to natural gas, which is expected in the area by late 1955.

L. O. Lord has been named acting superintendent of Wasson Gasoline Plants in Denver City, Tex., by Shell Oil Co. Lord, who has been a gas engineer in Shell's Midland offices since 1952, succeeds **Fray Piland,** who has been transferred to the Houston area.

Shuman Childress, former district clerk at Alice, Tex., has been promoted to division clerk of Magnolia Pipe Line Co.'s western division at Midland, Tex. **M. L. Butler,** former division clerk at Midland, Tex., has been transferred to Oklahoma City as division clerk of northern division. **L. C. Knight,** former division clerk at Oklahoma City, has been transferred to Little Rock, Ark. **Charles Bradley,** former district clerk at Little Rock, has been transferred to Alice, Tex., as district clerk of the southwest Texas district.

Herbert Hoover, Jr., has been appointed Undersecretary of State by President Eisenhower, effective October 1. Hoover, prominent in the oil industry for his work as a petroleum engineer and consultant, added national recognition to his international reputation as an oil expert by his successful handling of the Iranian problem following his appointment last September 12 as a special advisor to Secretary of State Dulles. A pioneer in the use of the seismograph in oil exploration, Hoover founded United Geophysical Co., which was acquired by Union Oil Co. of California in 1950. While operating United, Hoover was called on for consulting jobs which led to the formation of the consulting firm of Hoover, Curtice and Ruby. During the past 15 years he has served as consultant to the governments of Venezuela, Chile, Peru, Brazil, and Iran on technical and economic petroleum problems. Hoover is married to the former Margaret Watson, daughter of Douglas Watson, discoverer of the Kettleman Hills field. They have a son and two daughters, all married, and five grandchildren.

W. B. Burgess, superintendent of Humble Oil & Refining Co.'s gasoline plant at Kilgore, Tex., has been transferred to the Heyser gasoline plant as superintendent to succeed the late W. J. McDougal. Other Humble changes include: **Carl Lee Locke,** tool pusher at Imogene, transferred to Conroe, Tex.; **Hugh G. McKinley** promoted from roustabout gang pusher to farm boss at London, Tex., and **T. I. Goodwin,** tool pusher at Odessa, transferred to Winters, Tex.

DEATHS

Leonard L. Lookabaugh, 58, independent oil operator at Dallas, died there August 15. Lookabaugh worked with Shell Oil Co. for 12 years before becoming an independent in 1932.

Burton R. Ellison, 41, consulting geologist at Santa Maria, Calif., died in a hospital there recently. Ellison had been connected with various companies in the Taft area since 1936.

DeWitt Knox, 66, Southern California oil man and a 26-year member of the board of directors and secretary-treasure of Macmillan Petroleum Corp., died August 13 in a Los Angeles hospital.

H. S. Graver, Sr., products manager of the bulk tank division of Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., died recently in Chicago. Graver was the last living son of the founder of the company and had recently completed 50 years of service.

Rep. Paul W. Shafer of Michigan, 61, author of the postwar legislation which continued the synthetic rubber industry and last year provided for disposition of the government's plants, died in Washington August 17.

Arthur Franklin Tarver, 69, pioneer in Spindletop field, died in Shreveport August 12. He was an independent oil operator and drilling contractor until he retired 3 years ago.

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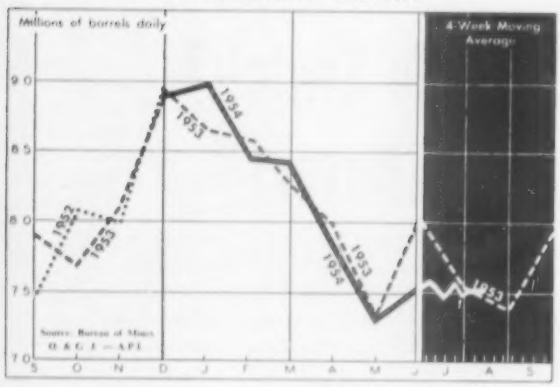
A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,147,850	DOWN	16,125	DOWN	431,897
Crude stocks	279,828,000	UP	84,000	UP	217,000
Completions	1,074	UP	7	UP	63
Refinery runs	6,735,000	DOWN	9,000	DOWN	357,000
Gasoline stocks	156,328,000	DOWN	480,000	UP	14,673,000
Four-product stocks	353,032,000	UP	3,370,000	UP	18,616,000
Total imports	916,500	DOWN	83,000	UP	7,900

TOTAL DEMAND—ALL OILS



Good Prices, Resulting High Runs Created Part of Gasoline Surplus

PART of the big surplus of gasoline in P.A.W. District 2 has been the result of good gasoline prices and relatively stable markets.

Early in June 1953, just before crude prices were raised 25 cents a barrel, the low of the spot market for Mid-Continent regular gasoline was 10.375 cents a gallon compared with 10.75 cents on the Gulf Coast and 12 cents for barge delivery in New York Harbor.

Crude prices increased on June 15, 1953, and the higher crude postings were reflected in product prices by the first of July. At that time, the Mid-Continent price had been raised to 11.375 cents, the Gulf Coast to 11.5 cents and the New York Harbor price to 13.5 cents a gallon. The Gulf Coast price moved up only 0.75 cent compared with a whole cent in the Mid-Continent.

High refinery runs and increased yields of gasoline boosted motor-fuel production so high that U. S. gasoline stocks at the end of September were about 23,000,000 bbl. more than a year earlier. The excessive inventories created a pressure that lowered gasoline prices on most markets. Prices were cut more in the Gulf Coast than in the Mid-Continent.

Before the end of the year, gasoline on the Gulf Coast was selling for less than it did before the crude price increase. East Coast prices moved below the pre-crude-increase level early in February. By that time, Mid-Continent (Group 3) quotations were down to 10.75 cents a gallon for regular compared with 10.375 cents before the crude price increase.

At the end of March 1954, Gulf Coast prices were down 0.75 cent a gallon from the pre-crude-increase level and East Coast quotations were down 0.5 cent.

The big drop in the Gulf Coast market made it necessary for refiners in that area to look for additional outlets for gasoline. The up-the-river market looked promising, barge rates were low, and the refiners needed a high yield of gasoline to prevent a big drop in the average realization from a barrel of crude. More gasoline started moving up the Mississippi River.

In the first 6 months of 1954, refiners moved 15,697,000 bbl. of gasoline up the river into District 2, or 2,890,000 bbl. over the same period a year earlier.

This increased movement up the river also shows up in the stock changes of the districts. In the first 6 months of this year, District 2 gasoline stocks increased 4,600,000 bbl. against a reduction of almost 2,000,000 in the same period of 1953.

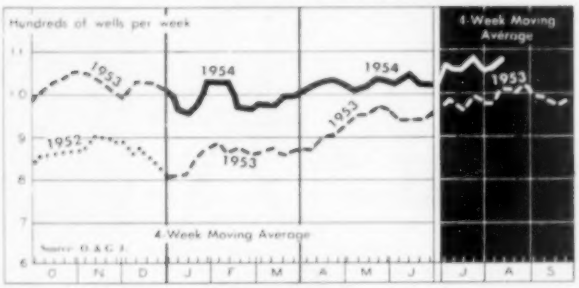
The reverse was true in District 3. Gasoline stocks decreased 3,400,000 bbl. in the first half of this year against a gain of 1,500,000 bbl. in the first half of 1953.

Stable markets in District 2 attracted sellers and created an inventory problem.

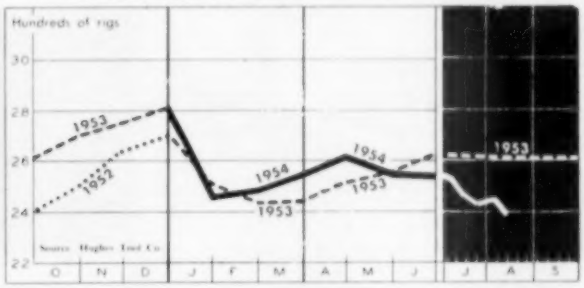
Gasoline price hiked . . . Socony-Vacuum Oil Co., Inc., last week announced a tank-wagon increase of .8 cent a gallon for both premium and regular motor fuel in 11 eastern states.

The announcement was the first upward price adjustment since last November. During the past 9 months, the company had cut its wholesale price on four occasions.

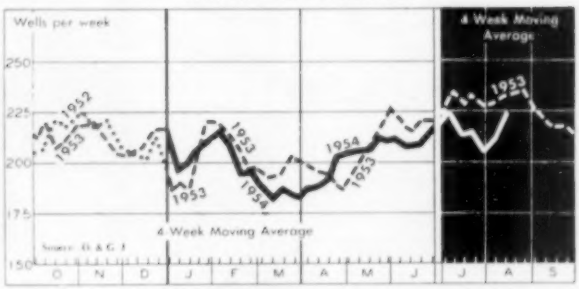
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

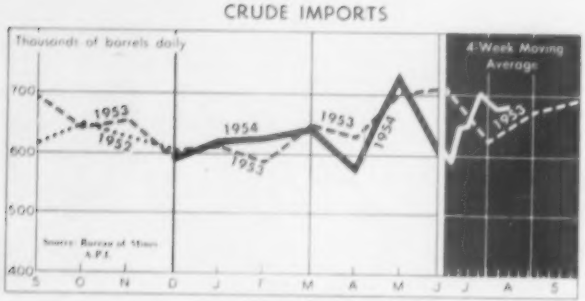
Area—	8-16-54	Change from 8-9-54	Change from 8-17-53
Gulf Coast	504	—32	— 72
N. and W. Texas-New Mexico	745	—24	— 45
Arkansas-N. Louisiana-E. Texas	166	3	20
Oklahoma	299	—29	— 70
Kansas-S. Nebraska	169	1	13
Illinois-Eastern	129	15	— 24
Rocky Mountain	262	7	— 9
Pacific Coast	121	1	— 38
Total United States	2,395	—58	—225
Western Canada	140	—17	— 38

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 14, 1954

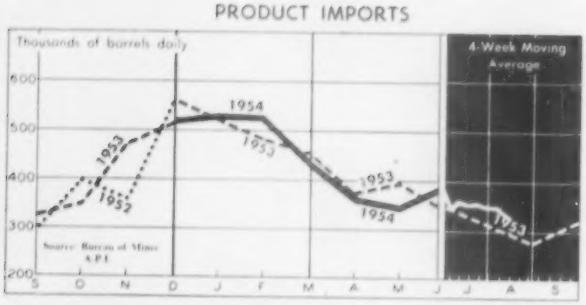
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	2	0	0	2	9,373	71	89	0	0	0	1	1	2	0	2	60	64
Arkansas	14	5	0	9	44,260	397	311	0	0	0	3	3	17	0	4	73	94
California	39	24	0	15	156,702	1,498	1,599	0	0	0	11	11	40	1	8	323	372
Colorado	21	6	1	14	112,797	817	408	0	0	1	8	9	23	0	11	311	345
Illinois	65	35	0	30	167,902	1,751	1,153	0	0	0	1	1	6	0	0	224	230
Indiana	14	7	1	6	20,853	477	791	0	0	0	0	0	5	0	0	87	92
Kansas	108	58	8	*42	369,928	2,823	3,066	1	0	2	13	16	50	0	14	374	438
Kentucky	16	9	0	7	26,351	696	662	0	0	0	0	0	11	0	3	71	85
Louisiana	86	53	6	27	548,321	2,135	1,619	5	0	1	13	19	72	39	23	207	341
North	38	28	3	7	115,136	1,159	667	1	0	1	5	7	11	3	8	82	104
South	48	25	3	20	433,185	976	952	4	0	0	8	12	61	36	15	125	237
Michigan	9	3	0	6	23,518	344	359	1	0	0	3	4	12	0	0	137	149
Mississippi	9	5	0	4	64,178	254	229	0	0	0	2	2	6	0	0	89	95
Montana	0	0	0	0	0	190	249	0	0	0	0	0	3	0	1	55	59
Nebraska	14	7	1	6	76,268	234	208	1	0	0	4	5	15	0	3	75	93
New Mexico	15	13	1	1	70,186	679	862	0	0	0	0	0	12	0	12	69	93
North Dakota	9	4	0	5	66,733	178	161	0	0	0	5	5	4	0	0	65	69
Ohio	20	6	9	5	30,205	715	645	0	0	0	0	0	3	0	4	9	16
Oklahoma	148	94	3	†51	501,171	5,796	4,573	3	0	0	14	17	74	3	18	402	497
Pennsylvania-New York	45	15	12	‡18	97,888	1,482	1,541	0	0	0	1	1	0	0	5	26	31
Texas	419	241	28	150	1,777,609	11,528	10,772	32	0	10	87	129	521	50	106	2,613	3,290
Southwest (1 & 4)	72	35	3	*34	313,503	1,642	1,744	1	0	0	21	23	73	23	27	451	574
Gulf Coast (2 & 3)	57	24	10	*23	388,584	1,682	1,589	2	0	7	14	23	55	22	36	418	531
East (5 & 6)	11	6	1	4	48,168	598	507	0	0	0	3	3	8	0	9	176	193
North Central (7-B & 9)	176	117	2	57	518,098	4,344	4,086	25	0	1	23	49	243	4	13	1,058	1,318
West (7-C & 8)	75	48	0	27	413,417	2,658	2,344	4	0	0	22	26	140	0	14	453	607
Panhandle (10)	28	11	12	5	95,839	604	502	0	0	1	4	5	2	1	7	57	67
Utah	2	0	1	1	8,265	47	46	0	0	0	1	1	3	0	1	24	28
West Virginia	5	0	5	0	11,093	347	374	0	0	0	0	0	0	0	18	10	28
Wyoming	11	8	0	3	61,716	827	423	0	0	0	2	2	27	0	4	117	148
Miscellaneous (Wash, S. D.)	3	0	0	3	6,947	87	39	0	0	0	3	3	2	0	0	19	21
Total United States	**1,074**	593	76	405	4,252,264	33,373	30,179	43	0	14	172	**229**	908	93	237	5,440	6,678
Total previous week	1,067	579	80	408	4,144,660			33	5	5	192	235	865	93	223	5,268	6,449
Total August 15, 1953	1,011	529	72	410	4,148,757			43	1	7	182	233	918	70	241	5,625	6,854

Service wells included: *1, †8, ‡15.

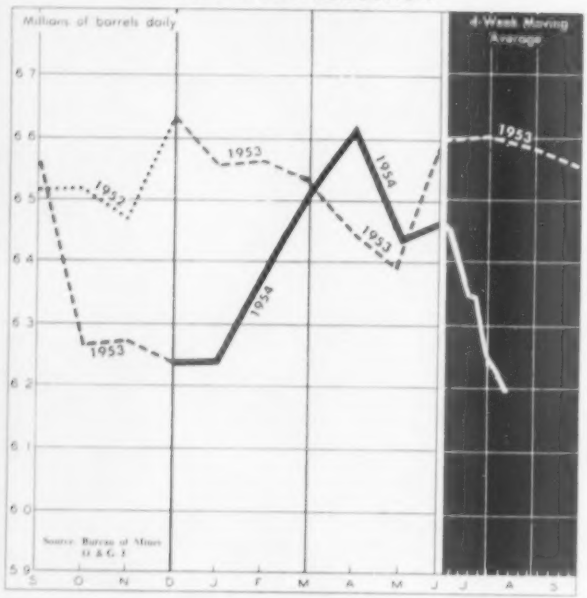
CRUDE IMPORTS



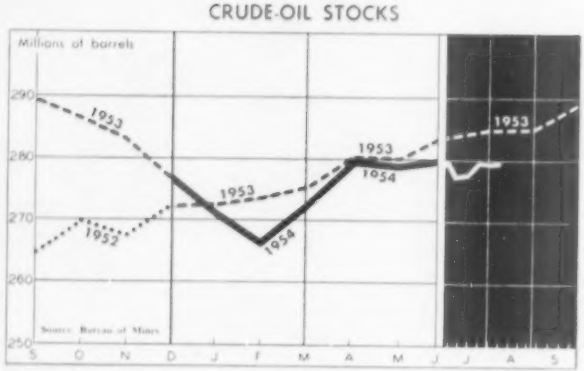
PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



CRUDE-OIL STOCKS



DAILY AVERAGE PRODUCTION FOR WEEK

	August 14			Aug. 7
	Crude oil	Lease condensate	Total	total
Alabama	4,300		4,300	4,400
Arkansas	76,400	550	76,950	75,350
California	975,000		975,000	975,200
Colorado	128,300		128,300	132,700
Eastern	55,100		55,100	55,100
Florida	1,500		1,500	1,500
Illinois	185,300		185,300	177,300
Indiana	28,600		28,600	28,200
Kansas	320,400		320,400	332,200
Kentucky	35,600		35,600	35,500
Louisiana	601,300	38,050	639,350	644,375
North	107,300	2,900	110,200	111,500
South	494,000	35,150	529,150	532,875
Michigan	32,100		32,100	33,900
Mississippi	87,100	3,000	90,100	90,500
Montana	37,400		37,400	37,600
Nebraska	19,600		19,600	19,100
New Mexico	205,950	1,650	207,600	208,325
Oklahoma	492,200		492,200	485,100
Texas	2,508,000	44,650	2,552,650	2,561,925
Dist. 1	41,200	350	41,550	41,525
Dist. 2	123,300	5,550	128,850	129,825
Dist. 3	400,000	22,200	422,200	424,200
Dist. 4	220,000	5,200	225,200	226,950
Dist. 5	42,000	250	42,250	42,325
Dist. 6	105,000	4,600	109,600	110,025
East Texas field	205,000		205,000	206,850
Dist. 7-B	125,000	25	125,025	124,175
Dist. 7-C	170,000	4,500	174,500	174,925
Dist. 8	814,000	1,800	815,800	818,800
Dist. 9	179,000	150	179,150	179,000
Dist. 10	83,500	25	83,525	83,325
Utah	4,800		4,800	4,800
Wyoming	246,800		246,800	246,100
North Dakota	‡14,200		‡14,200	‡14,800
Total U. S.	6,059,950	87,900	**6,147,850**	6,163,975
Change from previous week, down			**16,125**	
Canada	†281,025		†281,025	†249,775

Total U. S. production January 1-August 14 ..... 1,444,152,700 bbl.
Same period last year (crude plus cond.) ..... *1,475,516,115 bbl.

*Includes 20,708,900 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 100.

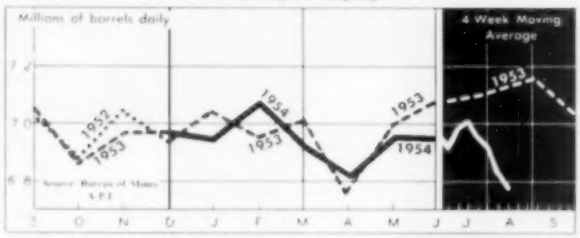
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

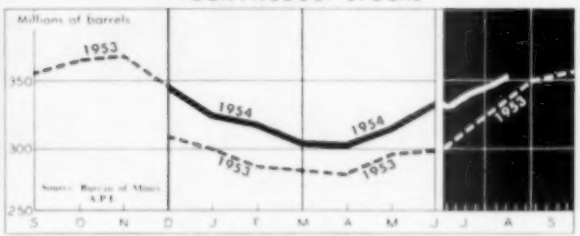
	Aug. 7, '54	July 31, '54	Aug. 8, '53
Pennsylvania Grade	3,034	3,124	2,677
Other Appalachian	1,804	1,564	2,230
Illinois, Indiana, Michigan	12,787	12,230	12,382
Kansas	9,707	9,372	9,218
Oklahoma	25,373	26,463	29,442
Arkansas	3,273	3,529	2,984
Louisiana	17,376	16,829	16,296
North	2,542	2,522	2,827
Gulf	14,834	14,307	13,469
Mississippi	3,246	3,227	3,412
New Mexico	8,825	8,830	7,667
Texas	132,080	132,266	132,872
East Texas proper	11,895	11,826	11,050
West Texas	57,527	57,010	59,422
Texas Gulf	27,782	28,891	27,779
Other Texas	34,876	34,539	34,621
Wyoming	13,531	13,360	13,944
Other Rocky Mountain	4,893	5,068	3,041
California	33,017	32,767	33,284
Foreign	†10,882	11,115	10,162
Total	279,828	279,744	279,611

*Bureau of Mines. †Includes 3,007,000 bbl. in California.

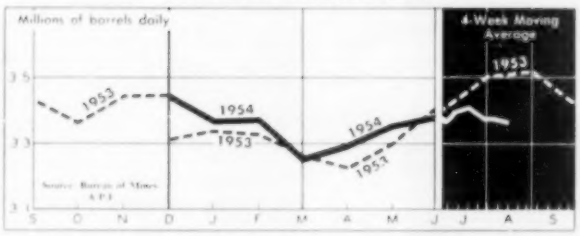
REFINERY RUNS



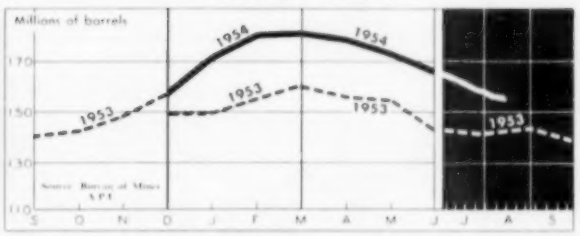
FOUR-PRODUCT STOCKS



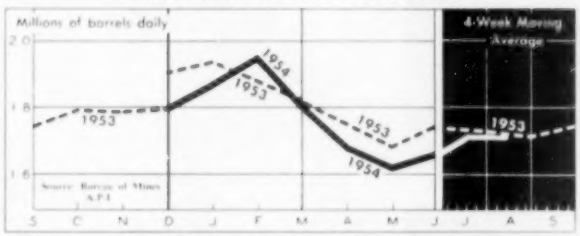
GASOLINE PRODUCTION



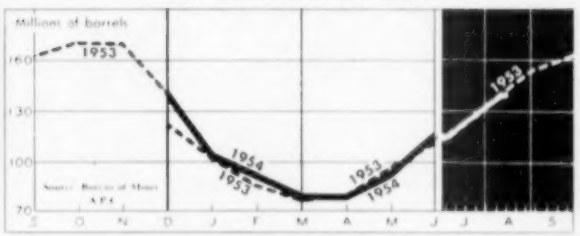
GASOLINE STOCKS



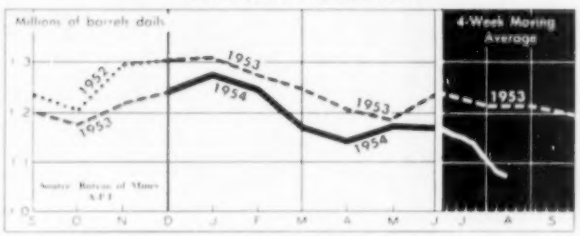
MIDDLE-DISTILLATE PRODUCTION



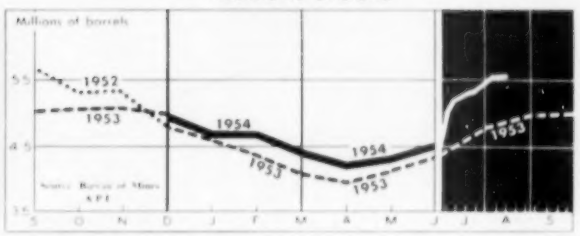
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, AUGUST 13

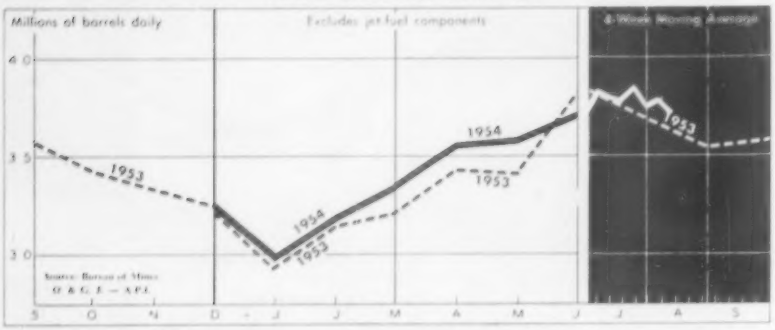
(Thousands of barrels)

(Excludes all jet-fuel components)

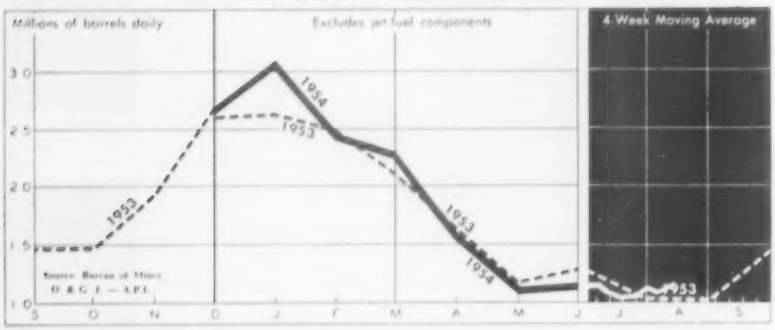
District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1953— Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,027	450.7	20.7	247.4	207.3	35,423	13,134	35,761	11,606	1,073	438.7	34.2	251.7	227.4
Appalachian:														
District 1	102	42.0	6.7	17.3	7.2	4,024	593	1,744	478	99	42.1	3.9	18.6	10.6
District 2	86	46.2	4.6	16.3	7.4	2,603	440	730	344	93	52.9	6.7	9.8	11.8
Ind., Ill., Ky.	1,301	691.0	77.7	234.1	150.4	35,868	8,434	22,512	4,854	1,351	740.9	79.4	231.3	168.2
Okla., Kans., Mo.	587	338.1	12.0	127.3	38.3	15,872	1,895	11,960	1,204	642	361.9	21.5	144.4	47.5
Inland Texas	230	159.7	6.7	40.3	24.6	5,686	408	1,996	1,291	266	188.4	8.8	43.1	34.0
Texas Gulf Coast	1,609	823.1	99.1	404.6	213.1	18,465	3,633	12,579	5,931	1,658	828.8	111.5	374.4	240.2
La. Gulf Coast	533	240.7	28.9	162.4	43.1	8,340	2,731	4,434	1,327	551	290.2	40.5	136.4	52.0
N. La. and Ark.	82	33.4	7.3	19.6	3.4	3,982	1,145	952	106	86	33.3	6.3	19.9	4.8
Rocky Mountain:														
New Mexico	19	11.9	1.0	3.0	2.9	222		71	33	21	12.7	0.5	3.5	3.1
Other Rocky Mtn.	245	114.9	6.0	56.4	37.7	6,985	296	2,528	838	260	123.1	3.0	53.5	40.5
California	914	411.9	4.4	133.9	349.9	18,858	396	12,659	27,661	1,063	478.5	4.3	150.1	382.3
Aug. 13, 1954	6,735	3,363.6	275.1	1,462.6	1,085.3	156,328	33,105	107,926	55,673	7,163	3,591.5	320.6	1,436.7	1,222.4
Aug. 6, 1954	6,744	3,393.7	282.1	1,374.1	1,069.3	156,808	32,539	105,077	55,238					
Aug. 15, 1953	7,092	3,577.6	284.7	1,440.0	1,233.6	141,655	32,167	110,169	50,425					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

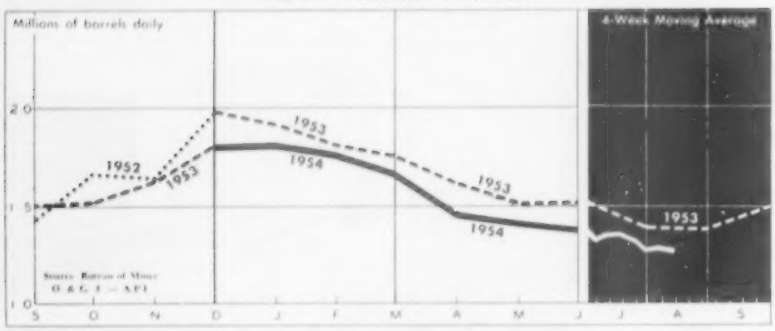
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of August 18, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.5-11	11.25-12	10.50-10.75
Premium gasoline	11.75-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	9.70-9.95	8.75-9
No. 2 straw fuel oil	8.25-8.5	8.95	8.25-8.5
No. 6 residual	$1.15-1.20	$2.05-2.25	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX
Mid-Continent

132-134 A.M.P.	6.0

• The market tone remained good last week on the Gulf Coast and East Coast and in the Mid-Continent. Heating oils on the gulf were up ¼ cent over the previous week, and there were no reports of movements under the new level. Demand for No. 2 fuel was strong both here and in the Mid-Continent.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 8-13-54	3,364	3,683
May 1954	3,377	3,463
June 1953	3,410	3,838
July 1953	3,501	3,690
Middle distillate:		
Four weeks ended 8-13-54	1,710	1,169
May 1954	1,673	1,169
June 1953	1,747	1,280
July 1953	1,735	1,035
Residual fuel:		
Four weeks ended 8-13-54	1,072	1,273
May 1954	1,148	1,356
June 1953	1,238	1,506
July 1953	1,224	1,390

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	.....	.....	.....
15-15.9	1.93	.....	.....	.....
16-16.9	1.99	.....	.....	.....
17-17.9	2.05	.....	.....	.....
18-18.9	2.11	.....	.....	.....
19-19.9	2.18	.....	.....	.....
20-20.9	2.24	$2.50	.....	$2.37
21-21.9	2.30	2.52	.....	2.39
22-22.9	2.37	2.54	.....	2.41
23-23.9	2.45	2.56	.....	2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	.....	2.76	3.09	2.63
34-34.9	.....	2.78	3.11	2.65
35-35.9	.....	2.80	3.13	2.67
36-36.9	.....	2.82	3.15	2.69
37-37.9	.....	2.84	3.17	2.71
38-38.9	.....	2.86	3.19	2.73
39-39.9	.....	2.88	3.21	2.75
40 and above	.....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices east of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective May 20, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.00-3.26
Middle District	3.20
Southwest Pennsylvania	2.81
West Virginia	2.75
Ohio	2.74
Illinois Basin	2.90-3.02

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THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses, 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

FOR SALE: 5000' 4" o.d. seamless line pipe 35 to 40' random. Clean inside and out, straight. Beveled, ready to lay. Ideal for water, oil, gas, air, etc., 35c. M. J. Regan Pipe Co., Coffeyville, Kan.

EIGHT CONTINUOUS Chillers with ammonia coils and agitators, Max B. Miller and Company, Vertical—10' x 30' tangent to tangent, 2'-9" skirt, riveted 3/8" shell, 1/2" heads, capacity—430 barrels, tubes—2,225' of 2" pipe, tube surface—1,414 sq. feet. Service-chilling oil, excellent condition. Will entertain offer for vessels less coils. Oklahoma Iron and Metal Company, Ponca City, Oklahoma.

ONE PORTABLE RIG, capable of 1000 foot with 4 1/2 inch drill pipe. Powered with D318 Caterpillar, 2400 hours actual. Approximately 800 foot 4 1/2 inch drill pipe. 41 foot hydraulic lift derrick. Tandem truck with winch. IHC water truck. C. H. W. Drilling Co., Elkhart, Kansas.

FOR SALE: One 55,000 bbl. tank located near Minden, La. Perfect condition. Will sacrifice for quick sale as is, where is. Contact V. B. Stone, 210 Morningside, phone 3312, Henderson, Texas.

Gaso Duplex 4 1/2" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

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SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

USED MODEL NB-30, 4-sheave Emsco traveling block with #460 B/J hook attached, rated at 100 tons capacity. Reasonably priced. Mountain Iron, Wichita, Kansas, L-D 229.

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others — Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

FOR SALE
INGERSOLL-RAND
GAS ENGINE DRIVEN COMPRESSORS

1—	XVG-8	—350 H.P.
1—	XVG-6	—250 H.P.
1—	XVG-4	—150 H.P.

ANY COMBINATION COMPRESSOR CYLINDERS. SPECIFY INLET AND DISCHARGE PRESSURES. PROMPT DELIVERIES.

EARL E. KNOX COMPANY
TELEPHONE: 2-5204
BACON STREET, ERIE, PA.

FOR SALE EQUIPMENT

TWO R. L. CARDWELL Double-Drum Spudders with 85-ft. 4-leg masts, one with 185 hp. W.A.K. and other with 145 hp. G.A.K. Waukesha motor. Draw works and motors recently overhauled. Dog houses, small tools. Machines running at present. Reason for selling, ill health. S. R. Lesselg, GA 7-1932 or P. O. Box 6206, Okla. City or W. D. Cunningham, 89K4, Alma, Okla.

FOR SALE: New and used Drilling Engines, 110, 140, 170 and 205 HP, Gas, Gasoline or Diesel; Under-Road Boring Machines; Generating Sets 3 KW to 300 KW. Young Engine Corp., Canton, Ohio. Rep.: A. E. Avers, Box 606, Tulsa, Okla.

250 KW Westinghouse Electric Generator Set, powered by 300 hp Sterling Natural gas engine, direct connected, 440 V, 3 ph. 60 cy, AC, excellent condition. Mounted unit steel base, price $6800. W. A. Caplis, Box 1312, Shreveport, La. Ph. 2-5312 nights.

FOR SALE

Thermal cracking refinery complete with lead plant 1250 barrel capacity presently operating manufacturing regular and premium gasolines, tractor fuel, diesel fuel and fuel oil. Located T&NO Railroad four miles from Lafayette, La. Population 40,000.
BREAUX BRIDGE OIL REFINING CO., INC.
P. O. Box 356, Breaux Bridge, La.
Telephone 7126

FOR SALE

We are moving Four Type 80 Cooper direct Gas Engine driven Compressors to warehouse in Seminole, Okla. These machines are in excellent condition and ready to go into service. We will furnish compressor cylinders correct size for Gasoline plant, or gas booster work. Our price as is or completely repaired, will be low and delivery at once.

Telephone or write

W. S. SMITH,

205 Thompson Bldg.,
Tele. 2-5473

FOR SALE
EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000' of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure, 2 pumps including Gardner-Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4 1/2" Grade E Hand Banded Drill Pipe, 6 1/4" and 7 3/4" Drill Collars. This rig is priced right. For details contact

BOX H-307, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

FRANKS MODEL 5000 Spudder — Serial No. 668. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 65' Double Leg Pipe Mast with 6⅝" and 7" Pipe Legs. 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit — Western Kansas. Contact Cardwell, Wichita.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE—TD-18 International Dozer with 12' blade. Good condition and ready to go. Located near Artesia, New Mexico. $5,000.00. Contact Malco Pipeline Company, Inc., Attention, F. E. Smith, Box 660, Roswell, New Mexico.

FOR SALE: 1 Mayhew 2000 heavy duty drill with auxiliary motor and 5 x 8 pump mounted on tandem drive Ford truck. In A-1 condition. Lewis & Clemens Drilling Co., Box 101, Princeton, Indiana, Telephone 1460.

FOR SALE TO SETTLE ESTATE: Nat'l. 150 Drilling Rig with 2 new #1879 Buda Engines, 7½ x 14 Oilwell PHD pump, 94' L. C. Moore Mast, 17½ Oilwell Rotary Table, #60 Oilwell Swivel, new kelly, 3500' new 4½" Drill pipe, Tool House with light plant, weight indicator, mud gauge and hand tools, 3 pipe baskets. Ready to go. Write or call: Dallas Cline or P. M. Cline, Mt. Carmel, Illinois.

LOADING RACK FOR SALE. 1—10 car steel walkway for loading rack, knocked down, good as new condition. Also one 9000 barrel steel riveted storage tank, erected, in good condition, suitable for re-erection. If interested in above, can make very attractive price on same. OIL FIELD SALVAGE COMPANY, Breckenridge, Texas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

FOR SALE

Complete Rotary Rig equipped with U-10 Draw Works, 2 WAK Waukesha Motors, 7¼" x 14" P-HD Oil Well Pump Unitized with LRO Waukesha and 6" x 12" Oil Well Pump Driven Off Draw Works Compound, 136' Lee C. Moore Cantilever Mast on 6'-5" Substructure, 6400' 4"-14# Drill Pipe, 12—2¼" x 6¼" x 30' Drill Collars, Steel Doghouse, Bunk House, Complete Set of Tools and Accessories. Rig located in West Central Texas.

CENTURY CORPORATION
330 Fidelity Union Life Bldg.
RAndolph 8677, Dallas, Texas

USED EQUIPMENT

Model E Allis-Chalmers Skid Unit mounted on International Truck. Located Great Bend, Kansas.

Franks 7000 Single Drum Skid Swabbing Unit mounted on Dodge Tandem Truck. Located Odessa, Texas.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Franks Super Senior Well Servicing unit 8 x 10 x 62 Single Pole Mast mounted on Tandem International Truck. Located Seminole, Oklahoma.

Write, wire or call Franks Mfg. Corporation, Box 3218, Whittier Station, Tulsa, Oklahoma.

FOR SALE EQUIPMENT

FOR SALE—Wichtex Model X5000 Spudder complete with tools and pipe. Contact Ekco Drilling Corp. Box 1167, Graham, Texas.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

OBSERVERS to operate and maintain advanced type equipment. Field experience and good electronic background essential. Do not apply unless fully qualified. P. O. Box 13148, Houston, Texas.

SOUTH AMERICA. Major Oil Company. Our fee paid. Mechanical Engineer—Petroleum Engineer—Chemical Engineer—All requiring Degree, experienced or inexperienced. Geologist, single. Must have degree, some experience. Tool Pusher—under 40, three years' experience. Accountant—Degree, Accounting major, single. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

CHIEF ESTIMATOR

Opening for man with plenty of experience estimating industrial and petrochemical work. Position is permanent for the right man, with an established and well known engineering and construction company with main office in Houston. In reply state experience in detail, furnish personal references, and salary expected. All replies held in strictest confidence. This is an excellent opportunity. Don't waste ours or your time answering unless you have top notch experience in estimating all phases of chemical plant work, and are capable of taking charge of our estimating department.

Address reply to: Box H-367, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
DRILLING ENGINEERS
PRODUCTION ENGINEERS

For foreign employment by established oil well drilling contractor. Candidates must be graduate engineers of wide technical and practical experience. Salary dependent upon experience and qualifications. Please write, giving full personal history and employment record. Please include telephone number. All applications will be considered confidential.

Box H-355, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

SEISMIC INTERPRETERS by expanding contracting company for its new method. Minimum requirements, college degree in geophysics or related fields, and 5 years' experience in West Texas, Anadarko basin, or New Mexico. Houston location. All replies strictly confidential. P.O. Box 13148, Houston, Texas.

FOREIGN EMPLOYMENT

In Saudi-Arabia

REFINERY OPERATORS

6 years operating process units, I.E. distillation - cat crackers - reformers - etc.

MATERIALS MEN

5 years oil refinery materials experience, including inventory and issuance control.

GAS SWEETENING-STABILIZER OPERATORS

5 years natural gasoline plant distillation or oil field production operation.

RECYCLING PLANT OPERATORS

5 years high-pressure gas injection operation using instrumentation control.

WATER TREATERS

3 years water treating and steam generating plant operation, including one year boiler firing.

Applicants must be high school graduates and capable of working with and training Saudi-Arabs.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 74

ARABIAN AMERICAN OIL COMPANY

505 Park Avenue

New York 22, New York

CHIEF ENGINEER and MAINTENANCE SUPERINTENDENT

Resourceful man wanted with at least seven (7) years experience in petroleum refinery maintenance and engineering department, two (2) years of which should be in areas with fairly severe winter conditions. Supervisory experience necessary as well as knowledge of catalytic cracking and coking plant operations. M. E. Degree or equivalent required.

Salary commensurate with ability. Reply by letter giving complete resume of personal and work history.

GREAT NORTHERN OIL COMPANY
P. O. Box 3596 **St. Paul, Minn.**

HELP WANTED

SEISMIC Party Chief for work in United States with degree in Geophysics, Geology, or Engineering, age 26 to 35, capable of advancing in small progressive contract seismograph company. Must be good interpreter. Salary commensurate with ability. Please include education and complete brief of experience in first reply. Replies confidential. Box H-331, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PERMANENT EMPLOYMENT with large organization for men to serve as Sales Engineers in electric logging. Will be stationed in large cities in operating areas to do quantitative and reservoir work with electric and radioactive logs. Must have degree in petroleum engineering, geophysics, or geology with a minimum of three years' experience, preferably both field work and reservoir study. Will be given thorough training in log interpretation. Box H-309, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED MAN wanted to supervise construction and operation of natural gas transmission system in Southeastern Kentucky. Also desirable to have knowledge of natural gas production. State salary desired and qualifications. Box H-364, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED SALES MANAGER WANTED

to organize sales division for a new oil field and pipeline unit. Must have experience with specialty salesmen and supply house contacts. Age 28 to 40 and capable of earning $25,000 per year.

Box H-346, The Oil and Gas Journal, Tulsa, Oklahoma

FOR A BETTER-PAID JOB

Production and Reservoir Engineers, Geologists, Draftsmen; Geophysicists, Party Chiefs, Computers and Field Crew Staff. WRITE US—STRICTEST CONFIDENCE.

GOOD EMPLOYMENT AGENCY
1554 California, Denver. AC 0835

EXPLORATION MANAGER

Independent oil company has opening for experienced Exploration Manager, to direct exploration activities in Mid-Continent and Rocky Mountain Areas. Must be capable of handling all phases of land and geological operations, originating and closing deals, and directing division or district offices, between ages of 30 to 40, with major oil company training preferred. Unilimited opportunity for person qualified. In replying give past employment record, educational background, and full personal data.

BOX H-373,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

Sales Manager

Wanted For

Growing Oil Well

Equipment Business

Engineering education, 10 to 15 years' experience in sales and supervisory capacities. Major oil company contacts required. Age 35-45. Compensation open.

Submit detailed resume of education, experience, and salary requirements. Replies confidential.

BOX H-374,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

HELP WANTED

WANTED: Distributor for Gas Lift Equipment in West Texas. Preferably Engineering or sales organization now operating in West Texas. Commission far above average. Macco Oil Tool Co. Inc., P. O. Box 7288, Houston 8, Texas.

EXPERIENCED Tank and Tubular Goods salesman with established contacts. Write Box H-360, The Oil and Gas Journal, Tulsa, Oklahoma.

NATURAL GAS AND GASOLINE SUPERVISOR

Well established, growing oil Company needs man with broad general and technical experience in the field of natural gas operations. Company operations will include handling and delivering of various types of gas on a major scale from different fields.

Applicant must be thoroughly familiar with producing, gathering, treating, dehydrating and processing techniques and economics. Must also be capable of negotiating gas sales contracts and construction contracts.

Salary commensurate with knowledge and experience.

Forward applications, giving age, education, experience, expected salary and references to Mr. J. W. McKinnon, Hudson's Bay Oil and Gas Company Limited, 534—8th Avenue West, Calgary, Alberta, Canada. Applications will be held confidential, if desired.

SALES REPRESENTATIVE — Top-notch man who knows engineering and construction business from A to Z. Preferably familiar with petroleum refining. Outstanding opportunity. Box H-352, The Oil and Gas Journal, Tulsa, Oklahoma.

DUE TO EXPANSION program large independent oil company has openings for assistants in seismic recording and computing. College graduates with at least one year of experience in geophysics desired. Ample opportunity for advancement. Give educational and previous employment details in initial letter and include photograph. All replies confidential. Box H-265, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Mathematical Analysis Group has openings for TWO mathematicians or physicists with advanced degrees and background in applied mathematics, numerical analysis and digital computing.

One position involves planning and supervision of numerical analysis and digital computing on reservoir engineering and petroleum production problems.

The other position involves mathematical analysis of refinery, pipe line, and exploration problems, including linear programming for optimum operations.

New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City Oklahoma.

GRADUATE CHEMICAL ENGINEER for work in research laboratory of major oil company; also Sales Engineer with degree in chemical or mechanical engineering and experienced in Liquefied Petroleum gas products sales and distribution. State experience and qualifications, Box 521, Tulsa, Oklahoma.

SEISMOGRAPH PARTY CHIEF for small aggressive company. Minimum five years experience. Send transcript of college credits and brief outlining experience. Opportunities unlimited. Replies confidential. Box H-365, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Graduate engineer, thoroughly experienced in all phases of core analysis work, by established commercial core laboratory. Profit participation for proven ability and loyalty. In reply, state qualifications and salary expected. Abilene Sample Log Service, P.O. Box 1939, Abilene, Texas.

PETROLEUM ENGINEER
Drilling Engineer
Production and Reservoir Engineer

Positions open in Arabia. Require suitable educational background and 3 to 5 years experience. One year contract. No family quarters. Excellent salary and benefits. Apply in writing, furnishing full description of experience and qualifications to:

AMERICAN INDEPENDENT OIL CO.
111 Sutter St., San Francisco

HELP WANTED

OIL CORPORATION

Stable and independent, expanding midcontinent and Rocky Mountains, seeks man with several years general oil experience to handle drilling contracts and to develop partial financing of drilling deals. Travel some. Attractive personality, sound judgment, age 25-40. Send picture, work resume, to Personnel Director, Builders, Inc., 352 N. Broadway, Wichita, Kansas.

CHEMICAL ENGINEER—with 2-4 years technical experience in petroleum refinery operations. Position in research and engineering department of chemical company in midwest area. Work invloves petroleum refining and fuel manufacturing relationships. Box H-372, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

GEOPHYSICAL SUPERVISOR, 17 years with major oil company, desires other connections. Seismograph experience, surveyor, observer, interpreter, party chief, supervisor. B.S. in Civil Engineering. Age 45. Rocky Mountain Region preferred. Box H-354, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Nine years experience Major Geophysical Company, desires employment, permanent location or foreign. Box 476, Taft, Calif.

PIPELINE SUPERINTENDENT—B.S. Mechanical Engineering, B.S. Administration. Thorough experience in designing and installing automatic pump stations, piping layout, remote control equipment and operations. Thirteen years experience with major oil company. Under 40. Box H-348, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED PROFESSIONAL Engineer; With broad experience in all phases of oil field operations including water flooding, desires to manage operations or act as consultant. P. O. Box 9678, Dallas, Texas.

GENERAL MANAGER or Field Superintendent with independent or individual. Petroleum Engineering degree, 10 years varied drilling, production and management experience. Salary or salary and interest. Box H-340, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM PRODUCTION Engineer—Seven years' experience with major in drilling, primary and secondary recovery operations. Age 34; married; presently employed. Desires responsible engineering position with established producing company in Mid-Continent, Permian Basin, or Rocky Mountain areas. Box H-358, The Oil and Gas Journal, Tulsa, Oklahoma.

MINING GEOLOGIST—Ph.D., employed, would like to serve gas or oil company intending to enter the field of the rare and radioactive ores, either in a consulting capacity or full-time employment. References available. Box H-349, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 30, married. Interested in foreign work as a career, preferably South America. Have degree and 6 years experience with major company doing subsurface and research. Box H-366, The Oil and Gas Journal, Tulsa, Oklahoma.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAXIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.

146 Allen Building, Midland, Texas,
Phone 2-2962.

SITUATIONS WANTED

SALES EXECUTIVE, over twenty years in the oil field equipment industry, covering wide range of experience in the manufacture and sale of drilling and production equipment and service, both foreign and domestic. Desire responsible position with responsible company. Presently employed, available within reasonable time. Box H-368, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, age 35, 7 years Major Company experience in drilling and production, reservoir, property evaluation, joint interest operations. Presently employed. Desire position with small company or independent where initiative counts. Box H-370, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 8 years major company in production, reservoir engineering, secondary recovery, proration, drilling. Desires change. Box H-356, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

ASSISTANT GENERAL Manager-Landman desires new connection. Fifteen years experience with independents. Negotiate farmouts and trades, evaluate submittals. Fully experienced in Federal Oil & Gas. Manage office and personnel. Have accounting background familiar with tax problems, oil accounting systems, routines. Age 38. BBA degree. Box H-344, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

REAL ESTATE

FOR SALE: Modern Air-Conditioned office building, suitable for medium size petroleum or allied firm. Equipment yard and garage with adequate parking facilities located in a desirable area of Tulsa. Box H-369, The Oil and Gas Journal, Tulsa, Oklahoma.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal

RANCH FOR SALE

4500 acre deeded ranch in Montana, one hour west of Billings. 300 cow capacity. 400 acres hay of which 250 acres is irrigated. 350 acres winter wheat. Two-year-old modern home, two fireplaces, six bedrooms, four baths, natural gas heat. Cabin on trout stream near house. School bus. Will sell with or without cattle and/or machinery. Inquiries invited.

A. J. HENRY
Columbus, Montana

OIL PROPERTY MANAGEMENT

PETROLEUM MANAGEMENT INC.

COMPLETE OPERATION OF
PRODUCING OIL AND GAS PROPERTIES

WELL COMPLETIONS
LIFTING COST ANALYSES

907 Cravens Bldg.
OKLAHOMA CITY, OKLA.
CEntral 2-7911

General Office:
CENTRAL BLDG., WICHITA, KANS.

ROYALTIES

FOR SALE: Landowners royalty on four hundred acres in West Sage Stouctune, Big Horn County, Wyoming, one mile from production. Leased to Major Company. Box H-328, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED TO BUY Producing Royalties. Submit full particulars for our engineer's approval, including payments, plat, etc. Box 276, Rutherford, N. J.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg. Tulsa, Okla.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

FOR SALE: 80-acre Rogers County, Oklahoma, waterflood property; core analyses by Oilfield Research indicate minimum 236,000 barrels recoverable oil; 330-ft. drilling depth, ample water and other facilities. Box H-371, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCING Water Flood Property: Total 320 acres, one-third developed. Produced 25,000 bbls. last twelve months. $50,000.00 worth of operating equipment. Seven producing wells. For sale at bargain of $125,000.00. Contact Mr. Roger H. Davis, 220 Mercantile Commerce Building, Dallas, Texas.

400 ACRE producing Oil lease. Four wells pumping small production. Negotiation is under way for six more wells. Two for water and four for oil. These will be completed and included in the bargain price for this property. $75,000. Location Rogers County, Okla. Reason for selling Partners disagree. James E. Jenkins, Murray, Nebr.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SHALLOW PRODUCTION: Want an oil or gas well drilled, see Carroll & Jones, Inc., cable tool drilling contractors (formerly Carroll Drilling Corporation) for leases, drilling deals, and water flood properties. Phone 4637, or write P.O. Box 655, Bowling Green, Kentucky.

FOR SALE: 320-acre lease, Chautauqua County, Kansas. One well producing eight barrels daily from Arbuckle lime. Contact Thos. C. Forbes, Eureka, Kansas.

GAS COMPANY desires to purchase producing or shut-in gas properties. Also desirous of drilling proven or wildcat gas prospects. Replies confidential. Box H-310, The Oil and Gas Journal, Tulsa, Oklahoma

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

WANTED: Major company wants to acquire oil producing property for experimental purposes. Must be producing from closed sandstone reservoir. Prefer depth less than 1500 feet, at least 10 feet of clean sand, and productive area less than 200 surface acres. Submit details to Box H-343, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

FOR SALE—1200 acre Oil & Gas lease, Kidder County near Robinson. Write for price & information. Mrs. Jennie Seele, Robinson, No. Dakota.

HAVE 3500 ACRES undeveloped acreage and twenty producing wells in Kevin-Sunburst field, Montana. Will sell and/or make a good deal for drilling capital. Phone 2162 or write Ray Sorrell, Shelby, Montana.

WILL BUY A 1/8 interest in a 7/8 drilling deal, either dry hole or turnkey, Texas, Okla., New Mex., La., Wyo., Kansas. No other states considered. Give full partic. No promoters. Box 22, Emmaus, Pa.

OLD ABANDONED Tennessee well now flowing oil through plug. Will lease to party interested in drilling. Hayes, 5125 Warwick, Chicago.

FOR SALE: Interests in oil producing properties in Shackelford County, Texas and in Dawson County, Texas. Box H-362, The Oil and Gas Journal, Tulsa, Oklahoma

MAP STICKS

KRAFTBILT, ALL-PLASTIC SNAP-ON MAP STICKS: Light-weight resilient plastic clips snap maps to sticks in seconds—eliminate rolled map-handling problems. Bright colored Index Flags—plugged in one end of sticks, carry labeled identity and instantly "flag" the maps you want. Send for Catalog 352-A, Ross-Martin Co., P.O. Box 800-A, Tulsa, Okla.

BUSINESS OPPORTUNITIES

INVESTMENT GROUP has cash for producing properties, proven and semi-proven drilling deals. Submit full details. Box 46721, West Branch, 817 N. Hilldale Ave., Los Angeles 46, California.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for Catalog 352-B. Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

LOST AND FOUND

REWARD FOR RETURN OF DIAMOND CORE BIT: Lost one 6¾ by 1¾ HH-40 Wire Line Diamond Core Bit, Serial No. UC-2 containing diamonds weighing 390.32 cts. Reward for information leading to recovery. Box H-311, The Oil and Gas Journal, Tulsa, Oklahoma.

Schlumberger Opens Office at Gretna, La.

Schlumberger Well Surveying Corp. has recently established new district offices and a division maintenance center at Gretna, La. The Gretna district is under the supervision of Carl F. Schwab.

Field units which formerly have been located at Harvey have been moved to the new center. The South Louisiana division of Schlumberger is under direction of H. W. True.

Oilwell Promotes Huckaby

Promotion of Loyd D. Huckaby as field representative at Houston for U. S. Steel's oil well supply division has been announced by M. F. Jones, manager of Oilwell's Gulf Coast area.

Huckaby was employed by Oilwell in 1952 at the Alice, Tex., store and transferred to Houston in 1953. He holds a Bachelor of Business Administration degree from the University of Texas.

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LEGAL

SEALED BIDS for Oil and Gas leases on the Crow Indian Reservation, Montana, will be received in the Office of the Superintendent, Crow Agency, Montana, until 2:00 o'Clock P.M. (M.S.T.), Wednesday, September 8th, 1954, at which time they will be opened and publicly read. Sixty-two (62) Units involving 16,383.40 acres of individually owned trust lands, a portion of which mineral rights are reserved for the benefit of the Crow Tribe by Act of Congress, will be offered. For further detailed information and a list of lands advertised, call or write: L. C. Lippert, Supt., Crow Indian Agency, Crow Agency, Montana.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 26 parcels of land totaling 5113.90 acres within the known geologic structure of certain producing fields in Eddy and Lee Counties, New Mexico, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p. m., E.S.T., on October 15, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Santa Fe, New Mexico, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Chief, Division of Minerals.

LEGAL

Notice is hereby given that sealed bids for oil and gas leases on approximately 43,228.40 acres of Allotted and Tribal restricted Indian lands in Roosevelt and Daniels Counties on the Fort Peck Indian Reservation, State of Montana, will be opened at 2:00 P.M., Mountain Standard Time, August 25, 1954, at the Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale may contact the Superintendent, Fort Peck Indian Agency, Montana, or telephone, Poplar, 2181.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that nine parcels of land totaling 1480 acres within the known geologic structure of Boone Dome Field in Natrona County, Wyoming, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p. m., E.S.T., on September 15, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Cheyenne, Wyoming, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Chief, Division of Minerals.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 17 parcels of land totaling 6908.17 acres within the known geologic structure of Cedar Creek Field in Bowman County, North Dakota, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p. m., E.S.T., on October 27, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Billings, Montana, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Chief, Division of Minerals.

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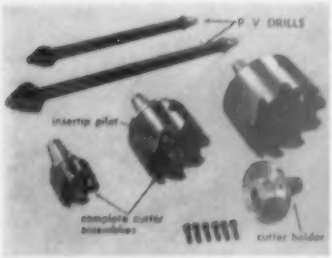

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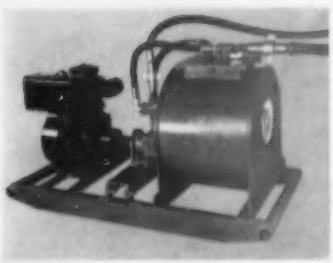

UPPER PHOTO: COMPACT HYDRAULIC MOTOR & CONTROL VALVE REPLACE AIR MOTOR ON TAPPING MACHINE.

LOWER PHOTO: ENGINE-DRIVEN HYDRAULIC PUMP, SKID MOUNTED WITH FLUID TANK, SUPPLIES POWER TO HYDRAULIC MOTOR THROUGH 50 FT. HOSES.

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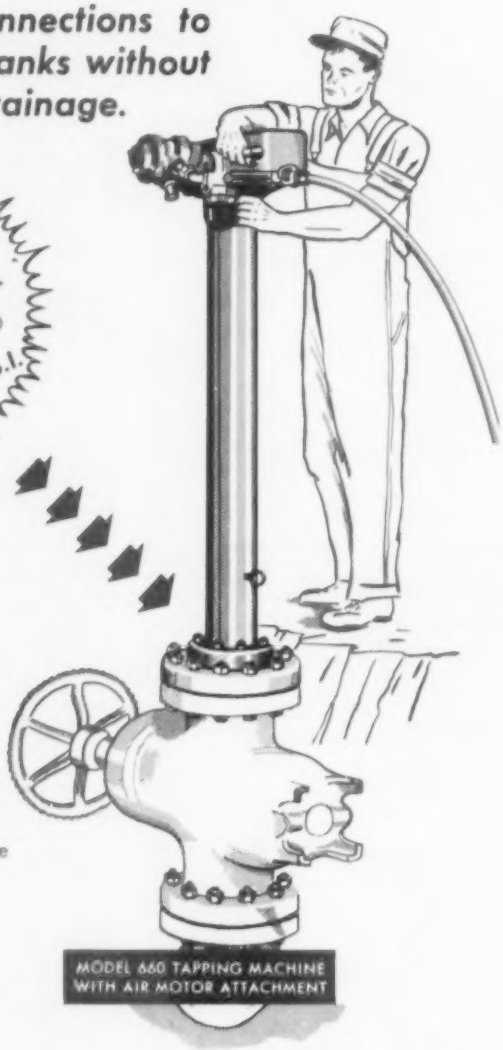

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